

Consulting  
Engineers and  
Scientists

## Human Health Risk Characterization

Buffalo Outer Harbor  
Buffalo, New York

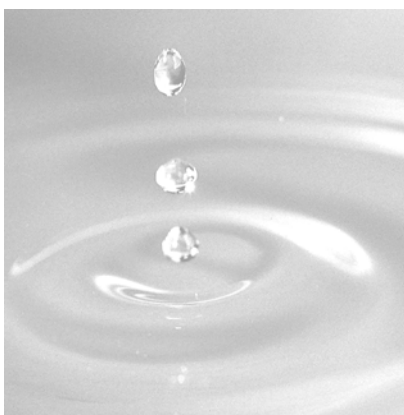
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## Executive Summary

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GEI Consultants, Inc. (GEI), on behalf of LiRo Engineers, Inc. (LiRo), prepared this Human Health Risk Characterization (HHRC) for a portion of the Buffalo Outer Harbor, located west of Fuhrmann Boulevard and comprising the area from the newly constructed bike park to the south to Wilkeson Pointe Park to the north, in Buffalo, NY (the Site). The Site excludes the Greenway Nature Trail Easement located along the Lake Erie shoreline adjacent to the Site, which was constructed with a cover system under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program. The Site has been the subject of several environmental investigations that reported the presence of semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and metals in surface and subsurface soil to a depth of 10 feet below ground surface (bgs). This HHRC was prepared to evaluate the results of soil sampling and to characterize risk to human health from potential exposure to remaining contamination in surface and subsurface soil at the following five Areas of Concern (AOC) at the Site:

- Area D
- Area C – Cottonwood Copse
- Area C – South and East of Cottonwood Copse
- Bell Slip
- Wilkeson Pointe – Undeveloped Portion

The objective of the HHRC is to determine whether soil contamination present at each AOC poses unacceptable risk to human receptors based on proposed redevelopment, and to aid in decisions regarding the need to implement engineering controls or institutional controls to prevent exposure of future Site users and workers to remaining soil contamination. The Site was largely created as a result of land reclamation and filling that has occurred over the past 100 years. Fill materials have been reported to consist of dredge spoils from US Army Corps of Engineers and miscellaneous filling from human activities, including storage of construction fill, operation of a landfill/transfer station, and disposal of incinerator ashes and noncombustible rubbish (i.e., municipal waste) from the City of Buffalo.

Based on previous environmental investigations at the Site, approximately 250 surface and subsurface soil samples from 0 to 10 feet bgs were collected within the AOCs. The following chemicals of potential concern (COPCs) were identified for surface and subsurface soil within AOCs at the Site:

- Metals – aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, silver, thallium, vanadium and zinc.

- PAHs – benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and phenanthrene.
- SVOCs – hexachlorobenzene
- PCBs – aroclor 1248, aroclor 1254 and aroclor 1260
- Pesticides – aldrin, DDT, DDD, and endrin

Portions of the Buffalo Outer Harbor Civic Improvements project are currently in the planning phase for redevelopment into recreational space. Recently redeveloped portions of the Area D AOC include a bike park, mountain biking trails, and a great lawn. Additional improvements being considered for the AOCs include an amphitheater, pollinator meadows, recreational lawn areas, meadow areas with walking trails or boardwalk trails, extension of mountain bike trails, beer garden/restroom facilities, and public water access. Based on proposed redevelopment, GEI evaluated the following potential human receptors at each AOC:

- Child and adult recreational visitor;
- Adult outdoor worker; and
- Adult construction worker.

We assumed a recreational visitor would only have contact with the top one foot of soil and an outdoor worker and construction worker may contact surface and subsurface soil to a depth of 10 feet as a result of landscaping, maintenance, and excavation activities.

This HHRC concluded the following for each AOC:

- There is no risk to the child and adult recreational visitor from exposure to surface soil (0 to 1 feet bgs) through incidental ingestion, dermal contact, and inhalation at the following AOCs evaluated in this HHRC: Area C – Cottonwood Copse AOC, Area C – South and East of Cottonwood Copse AOC, Bell Slip AOC, and Area D AOC.
- There is non-cancer risk to a child recreational visitor from exposure to surface soil (0 to 1 feet bgs) through incidental ingestion, dermal contact, and inhalation at the Wilkeson Pointe – Undeveloped Portion AOC. This AOC includes the undeveloped northeastern portion of Wilkeson Pointe, currently covered with grass and trees and where a clean soil cover was not previously applied. Risk to a child recreational visitor at this AOC is primarily attributable to exposure to benzo(a)pyrene, manganese, thallium, and lead in surface soil. Risk to a recreational visitor at this AOC will be mitigated by institutional controls such as fencing implemented as part of the Site Management Plan to limit access. Wilkeson Pointe Park to the west of the undeveloped portion was already redeveloped with a 1-foot clean soil cover system.

- There is non-cancer risk to a construction worker from exposure to surface and subsurface soil (0 to 10 feet bgs) through incidental ingestion, dermal contact, and inhalation at the Bell Slip AOC and the Area D AOC. Risk to a construction worker at these AOCs is primarily attributable to exposure to DDD, aroclor 1254, antimony and manganese. Risk to a construction worker will be mitigated by controls implemented as part of the Site Management Plan and Excavation Work Plan.
- There is no risk to the construction worker from exposure to surface and subsurface soil (0 to 10 feet bgs) through incidental ingestion, dermal contact, and inhalation at the following AOCs evaluated in this HHRC: Wilkeson Pointe – Undeveloped Portion AOC, Area C – Cottonwood Copse AOC, and Area C – South and East of Cottonwood Copse AOC.
- There is no risk to the outdoor worker from exposure to surface and subsurface soil (0 to 10 feet bgs) through incidental ingestion, dermal contact, and inhalation at all the AOCs evaluated in this HHRC, including the following: Wilkeson Pointe – Undeveloped Portion AOC, Area C – Cottonwood Copse AOC, Area C – South and East of Cottonwood Copse AOC, Bell Slip AOC, and Area D AOC.

Risk management strategies implemented at the Area D AOC include both engineering controls and institutional controls to mitigate exposure to surface and subsurface soil during recreational use (LiRo, 2019). These risk management strategies will be implemented at all the AOCs as needed during redevelopment of the Site for recreational use.

# 1. Introduction

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GEI Consultants, Inc. (GEI), on behalf of LiRo Engineers, Inc. (LiRo), prepared this Human Health Risk Characterization (HHRC) for a portion of the Buffalo Outer Harbor, located west of Fuhrmann Boulevard and comprising the area from the newly constructed bike park to the south to Wilkeson Pointe Park to the north, in Buffalo, NY (the Site). The Site excludes the Greenway Nature Trail Easement located along the Lake Erie shoreline adjacent to the Site, which was constructed with a cover system under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program. The Site has been the subject of several environmental investigations that reported the presence of semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and metals in surface and subsurface soil to a depth of 10 feet below ground surface (bgs) at concentrations greater than NYSDEC Soil Cleanup Objectives (SCOs).

This HHRC was prepared to evaluate the results of soil sampling and to characterize risk to human health from potential exposure to remaining contamination in surface and subsurface soil at the following five Areas of Concern (AOC) at the Site:

- Area D
- Area C – Cottonwood Copse
- Area C – South and East of Cottonwood Copse
- Bell Slip
- Wilkeson Pointe – Undeveloped Portion

Figure 1 shows the location of each AOC within the Site. The objective of the HHRC is to determine whether soil contamination present at each AOC poses unacceptable risk to human receptors based on proposed redevelopment, and to aid in decisions regarding the need to implement engineering controls or institutional controls to prevent exposure of future Site users and workers to remaining Site contamination. This HHRC was conducted in accordance with applicable risk assessment guidance developed by EPA (1989), and available NYSDEC and New York State Department of Health (NYDOH) technical guidance (NYSDEC, 2006; 2010).

Environmental investigations conducted at the AOCs as well as remedial activities and risk management strategies conducted during redevelopment are discussed in Section 2. Compounds of Potential Concern (COPCs) are identified in Section 3. The Exposure Assessment is presented in Section 4, which discusses remaining sources of contamination, affected media, potential routes of exposure, and potential human receptors under future conditions at the AOCs. Section 5 presents the Toxicity Assessment for COPCs identified



at the Site. Section 6 presents the HHRC for potentially complete exposure pathways. Section 7 presents potential sources of uncertainty in this HHRC. Section 8 presents the conclusions of this HHRC, and references are listed in Section 9.

## 2. Site Description

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The Site is located in the Buffalo “Outer Harbor” section of the City’s waterfront and is situated along the Lake Erie shoreline within a protected harbor. For this HHRC, the Site is defined as the portion of the Buffalo Outer Harbor, located west of Fuhrmann Boulevard and comprising the area from the newly constructed bike park to the south to Wilkeson Pointe Park to the north (Fig. 1). The Site excludes the Greenway Nature Trail Easement located along the Lake Erie shoreline adjacent to the Site, which was constructed with a cover system under the NYSDEC Brownfield Cleanup Program. The area surrounding the Site is generally flat with a very gentle slope to the southwest towards Lake Erie. The Site was largely created as a result of land reclamation and filling that has occurred over the past 100 years. Fill materials have been reported to consist of dredge spoils from US Army Corps of Engineers and miscellaneous filling from human activities, including storage of construction fill, operation of a landfill/transfer station, and disposal of incinerator ashes and noncombustible rubbish (i.e., municipal waste) from the City of Buffalo. Fill material has been identified from 0 to 26 feet bgs and includes the following: landfill deposits; hydraulic fill with a silt and clay matrix; sand fill; construction debris fill; and industrial process fill consisting of crushed concrete, asphalt, brick, wood, ash, glass, plastic, slag, coal, and cinder.

Much of the Site is currently vacant, vegetated with urban or secondary growth grasses, shrubs, and some trees. Area C contains rubble piles, gravel drives and some foundations from previous buildings. The southernmost portion of the Site (Area D) was recently opened to the public for recreational use following the installation of a clean soil/pavement cover system ensuring the area is safe for recreational use. Likewise, the Greenway Nature Trail has a cover system. Wilkeson Pointe Park, the northernmost portion of the Site, also has a clean soil cover system in place, except for the northeastern portion of the park that was not intended for recreational use when the park was constructed.

### 2.1 Previous Site Investigations for AOCs

The following environmental investigations were conducted at the Site and included soil sampling at each of the AOCs:

- Limited Human Health Exposure Assessment for Portions of the Buffalo Outer Harbor, prepared by URS, dated February 2012, which provided the results of the “Phase I/Phase II Remedial Investigation Report – Buffalo Outer Harbor Site”, prepared by Dvirka and Bartilucci, dated December 1995;
- Phase II Environmental Site Investigation Report – Area D, prepared by LiRo, dated November 2017;

- Limited Phase II Environmental Site Assessment, Buffalo Outer Harbor, Cottonwood Copse, prepared by Ravi Engineering, dated October 2018;
- Draft Phase II Environmental Site Investigation Report – Area C, prepared by LiRo, dated April 2018; and
- Supplemental Soil Investigation for Portions of the Buffalo Outer Harbor, conducted by LiRo in October 2019.

Based on these environmental investigations, approximately 250 surface and subsurface soil samples from 0 to 10 feet bgs were collected across the Site within the AOCs. A description of the soil analytical data evaluated in this HHRC for each AOC is presented below and soil analytical data tables for each AOC are provided in Appendix A.

### **2.1.1 Area D AOC**

The Area D AOC includes the majority of Area D south of the Bell Slip AOC (Fig. 1). Undeveloped portions of the Area D AOC consist of vacant land with secondary vegetative growth (trees, shrubs, and grasses). Under the Outer Harbor Access & Activation Civic Project Phase 1B, Erie Canal Harbor Development Corporation (ECHDC) and their contractors completed numerous Area D improvements. These improvements include the creation of a great lawn in the central portion of the parcel, a bike activity park in the east portion of the parcel, a mountain bike trail, multiple paved bicycle/walking paths, and designated habitat zones. Remedial work conducted in conjunction with these improvements consisted of construction of a cover system with a demarcation layer, including 1 to 2 feet of a clean soil cover in portions of Area D programmed for recreational use (LiRo, 2019).

Analytical soil data for the Area D AOC includes 35 surface soil samples collected from 0 to 1 feet bgs and 53 subsurface soil samples collected from 1 to 10 feet bgs between August 2017 and October 2019. The Area D AOC surface soil data set (0 to 1 feet bgs) excludes surface soil samples located beneath clean cover material installed as part of the Area D redevelopment to prevent contact with soil. Soil samples were analyzed for VOCs, SVOCs, PCBs, pesticides, and metals. GEI evaluated all 88 soil samples for this HHRC. Analytes detected in soil samples collected from 0 to 10 feet bgs included VOCs, SVOCs, PAHs, PCBs, pesticides, and metals. Soil analytical data for the Area D AOC evaluated in this HHRC is presented in Appendix A-1.

### **2.1.2 Area C – Cottonwood Copse AOC**

Area C is the section of the Site north of the Bell Slip. The Area C – Cottonwood Copse AOC includes a central portion of Area C located adjacent to the Outer Harbor, vegetated with grasses, shrubs, and cottonwood trees (Fig. 1). Analytical soil data for the Area C – Cottonwood Copse AOC includes 25 surface soil samples collected from 0 to 1 feet bgs and 17 subsurface soil samples collected from 1 to 10 feet bgs between July 1989 and

October 2018. Soil samples were analyzed for volatile organic compounds (VOCs), SVOCs, PCBs, pesticides, and metals. GEI evaluated all 42 soil samples for this HHRC. Analytes detected in soil samples collected from 0 to 10 feet bgs included VOCs, SVOCs, PAHs, PCBs, pesticides, and metals. No redevelopment or remedial activities have been conducted at the Area C – Cottonwood Copse AOC. Soil analytical data for the Area C – Cottonwood Copse AOC evaluated in this HHRC is presented in Appendix A-2.

### **2.1.3 Area C – South and East of Cottonwood Copse AOC**

The Area C – South and East of Cottonwood Copse AOC includes the portion of Area C bordering the Area C – Cottonwood Copse AOC to the south and east, north of the Bell Slip AOC (Fig. 1). This AOC is primarily grass-covered with limited shrubs and trees. Analytical soil data for the Area C – South and East of Cottonwood Copse AOC includes 38 surface soil samples collected from 0 to 1 feet bgs and 29 subsurface soil samples collected from 1 to 10 feet bgs between July 1989 and October 2019. Soil samples were analyzed for VOCs, SVOCs, PCBs, pesticides, and metals. GEI evaluated all 67 soil samples for this HHRC. Analytes detected in soil samples collected from 0 to 10 feet bgs included VOCs, SVOCs, PAHs, PCBs, pesticides, and metals. No redevelopment or remedial activities have been conducted at the Area C – South and East of Cottonwood Copse AOC. Soil analytical data for the Area C – South and East of Cottonwood Copse AOC evaluated in this HHRC is presented in Appendix A-3.

### **2.1.4 Bell Slip AOC**

The Bell Slip AOC includes portions of Area C and Area D east of Bell Slip (Fig. 1). This AOC is primarily grass-covered with limited shrubs and trees. A portion of this AOC is paved and includes a parking lot with access to the Greenway Nature Trail. Analytical soil data for the Bell Slip AOC includes 26 surface soil samples collected from 0 to 1 feet bgs and 15 subsurface soil samples collected from 1 to 10 feet bgs between July 1989 and October 2019. Soil samples were analyzed for VOCs, SVOCs, PCBs, pesticides, and metals. GEI evaluated all 41 soil samples for this HHRC. Analytes detected in soil samples collected from 0 to 10 feet bgs included VOCs, SVOCs, PAHs, PCBs, pesticides, and metals. No redevelopment or remedial activities have been conducted at the Bell Slip AOC. Soil analytical data for the Bell Slip AOC evaluated in this HHRC is presented in Appendix A-4.

### **2.1.5 Wilkeson Pointe – Undeveloped Portion AOC**

The Wilkeson Pointe – Undeveloped Portion AOC consists of the grass-covered northeastern portion of Wilkeson Pointe (Fig. 1). This portion of Wilkeson Pointe was not intended for recreational use when the Wilkeson Pointe Park was constructed. Analytical soil data for the Wilkeson Pointe – Undeveloped Portion AOC includes six surface soil samples collected from 0 to 1 feet bgs and six subsurface soil samples collected from 1 to 5 feet bgs in October 2019. Soil samples were analyzed for SVOCs, PCBs, pesticides, and metals. GEI evaluated

all 12 soil samples for this HHRC. Analytes detected in soil samples collected from 0 to 5 feet bgs included SVOCs, PAHs, pesticides, and metals. No redevelopment or remedial activities have been conducted at the Wilkeson Pointe – Undeveloped Portion AOC. Soil analytical data for the Wilkeson Pointe – Undeveloped Portion AOC evaluated in this HHRC is presented in Appendix A-5.

## 3. Hazard Identification

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The Hazard Identification section summarizes the type and concentrations of chemicals detected in soil at each AOC and identifies chemicals of potential concern (COPC) in soil for each AOC.

### 3.1 Soil Data Evaluation

Consistent with EPA risk assessment guidance, chemicals of potential concern (COPCs) are identified for further evaluation in this HHRC. Chemicals that were never detected in soil (0 to 10 feet bgs) were eliminated as COPCs. Maximum detected concentrations of all chemicals detected in soil (0 to 10 feet bgs) within each AOC were compared to the NYSDEC Restricted Residential Soil Cleanup Objectives (SCOs), current through January 2020 as well as the EPA Regional Screening Levels (RSLs) for residential soil dated November 2019. The Restricted Residential SCOs are appropriate soil objectives for selecting COPCs at the Site because according to NYSDEC technical guidance (2006 and 2010), the restricted residential category is intended for sites with active recreational uses with a reasonable potential for soil contact, including designated picnic areas, playgrounds, or natural grass sports playing fields, including surrounding unpaved spectator areas. Chemicals were included as COPCs in this HHRC if the maximum detected concentration in soil at an AOC exceeded the NYSDEC Restricted Residential SCO value or EPA's conservative human health risk-based residential soil RSLs (EPA, 2019) when an SCO value was not available. Appendices A-1 through A-5 present the comparison of maximum detected concentrations of chemicals in soil to residential soil standards for the identification of soil COPCs at each AOC. Table 1 presents soil COPCs identified for each AOC.

Soil analytical results were qualified with a "J" to identify reported results less than the analytical Reporting Limit (RL) but greater than or equal to the Method Detection Limit (MDL), which represents the lower limit of the analytical method of analysis. Therefore, for those chemicals reported as non-detect in samples with elevated RLs, chemicals were not measured above the MDLs. We conservatively included all J qualified data in this HHRC to evaluate potential risk to human health.

### 3.2 COPC Selection

Soil COPCs identified for each AOC are presented below and summarized in Table 1. Soil COPCs identified for each AOC were further evaluated in this HHRC.

### **3.2.1 Area D AOC**

The following soil COPCs were identified for surface and subsurface soil at the Area D AOC:

- Metals – aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, silver, thallium, vanadium and zinc.
- PAHs – benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and phenanthrene.
- SVOCs - hexachlorobenzene
- PCBs – aroclor 1248, aroclor 1254 and aroclor 1260
- Pesticides – aldrin, DDT, DDD, and endrin

VOCs were excluded as COPCs in soil at the Area D AOC because they were either not detected or were detected at concentrations below residential soil screening levels.

### **3.2.2 Area C – Cottonwood Copse AOC**

The following soil COPCs were identified for surface and subsurface soil at the Area C – Cottonwood Copse AOC:

- Metals – aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, thallium, and zinc.
- PAHs – benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
- SVOCs – N-nitrosodiphenylamine
- PCBs – aroclor 1260

VOCs and pesticides were excluded as COPCs in soil at the Area C – Cottonwood Copse AOC because they were either not detected or were detected at concentrations below residential soil screening levels.

### **3.2.3 Area C – South and East of Cottonwood Copse AOC**

The following soil COPCs were identified for surface and subsurface soil at the Area C – South and East of Cottonwood Copse AOC:

- Metals – aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, thallium, and zinc.

- PAHs – benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

VOCs, PCBs and pesticides were excluded as COPCs in soil at the Area C – South and East of Cottonwood Copse AOC because they were either not detected or were detected at concentrations below residential soil screening levels.

### **3.2.4 Bell Slip AOC**

The following soil COPCs were identified for surface and subsurface soil at the Bell Slip AOC:

- Metals – aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, silver, thallium, vanadium and zinc.
- PAHs – benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and phenanthrene.
- PCBs – aroclor 1254 and aroclor 1260
- Pesticides – DDT, DDD, and endrin

VOCs were excluded as COPCs in soil at the Bell Slip AOC because they were either not detected or were detected at concentrations below residential soil screening levels.

### **3.2.5 Wilkeson Pointe – Undeveloped Portion AOC**

The following soil COPCs were identified for surface and subsurface soil at the Wilkeson Pointe – Undeveloped Portion AOC:

- Metals – aluminum, antimony, arsenic, barium, chromium, cobalt, copper, lead, manganese, mercury, and thallium.
- PAHs – benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

VOCs, PCBs, and pesticides were excluded as COPCs in soil at Wilkeson Pointe – Undeveloped Portion AOC because they were either not detected or were detected at concentrations below residential soil screening levels.



## 4. Exposure Assessment

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The exposure assessment identifies and describes human receptors that may come into contact with chemicals present in soil at the AOCs under future land use following redevelopment for recreational use. GEI characterized potentially complete exposure pathways and exposure profiles for each receptor. As part of the exposure assessment, GEI estimated the amount of each chemical that can potentially reach a receptor defined as the exposure point concentration, or (EPC) and developed exposure scenarios to represent conservative estimates of exposure by sensitive receptors. These exposure scenarios consist of information about the amount, frequency, duration, and route of exposure to each chemical. GEI integrated the exposure profile and EPC to yield exposure doses or concentrations. In this assessment, dose estimates are protective in that they are more likely to overestimate than to underestimate exposure.

### 4.1.1 Identification of Human Receptors

Portions of the Buffalo Outer Harbor Civic Improvements project are currently in the planning phase for redevelopment into recreational space. The Greenway Nature Trail/bicycle path extends the entire length of the Site bordering Lake Erie. Recently redeveloped portions of the Area D AOC include a bike park, mountain biking trails, and a great lawn. Additional improvements being considered for the AOCs include an amphitheater, pollinator meadows, recreational lawn areas, meadow areas with walking trails or boardwalk trails, extension of mountain bike trails, beer garden/restroom facilities, and public water access. As a result of redevelopment, potential human receptors at the AOCs include visitors, outdoor workers, and construction workers. GEI evaluated the following receptors at each AOC:

- Child and adult recreational visitor;
- Adult outdoor worker; and
- Adult construction worker.

### 4.1.2 Exposure Scenarios

Human receptors that may be present at the AOCs and their potential exposures to remaining contamination in surface soil and subsurface soil are described below. The Conceptual Site Model (CSM) for exposures, presented as Figure 2, provides a diagrammatic representation of the human receptors evaluated in this HHRC and their potentially complete exposure pathways. In the following subsections, we describe potential exposure pathways for each human receptor identified at the AOCs.

#### 4.1.2.1 Recreational Visitor

A child and adult recreational visitor may be exposed to surface soil (0 to 1 feet bgs) while recreating at AOCs. Consistent with EPA guidance (1989), we conservatively evaluated a recreational visitor at each AOC based on EPA's default residential soil exposure assumptions used to develop EPA's human health risk-based screening levels (RSL) (EPA, 2019). The only exception to this is we assumed an exposure frequency of 94 days per year instead of 350 days per year to account for the reduced exposure frequency for a recreational visitor compared to a resident. Consistent with NYSDEC (2006), we assumed soil contact only occurs during the warmer months of the year defined as the 31-week period from early April to early November, based on the latest date for the first fall frost (after November 10) and the earliest date for the last spring frost (April 10) in New York. Also consistent with NYSDEC (2006) technical guidance, we assumed that activity patterns of children and adults will further limit the number of days on which soil contact may occur. We assumed that children and adults are not outdoors visiting the Site every day and that they contact soil at the AOCs three days per week for three hours each day resulting in an assumed soil exposure frequency of 94 days per year.

A child and adult recreational visitor may be exposed to COPCs in soil from incidental ingestion, dermal absorption, and inhalation of fugitive dust. We assumed a child and adult recreational visitor may be exposed to soil 94 days per year, for up to 26 years, consistent with EPA guidance for residential exposure duration. We assumed a child recreational visitor ingests 200 mg/day of soil and an adult ingests 100 mg/day of soil (EPA, 2019). For the dermal exposure route, we assumed exposed skin surface area for a child and adult recreational visitor is 2,373 cm<sup>2</sup> and 6,032 cm<sup>2</sup>, respectively (EPA, 2019), representative of a residential exposure scenario where exposed skin includes the face, arms, hands, legs and feet. We assumed a child skin-soil adherence factor of 0.2 mg/cm<sup>2</sup>, which is the EPA skin-soil adherence factor for a child resident (EPA, 2019) and an adult skin-soil adherence factor of 0.07 mg/cm<sup>2</sup>, which is the EPA skin-soil adherence factor for an adult resident (EPA, 2019).

#### 4.1.2.2 Outdoor Worker

An outdoor worker may be exposed to surface soil (0 to 1 feet bgs) and subsurface soil (0 to 10 feet bgs) while conducting landscaping and maintenance activities at AOCs. We conservatively evaluated an outdoor worker at each AOC based on EPA's default outdoor worker soil exposure assumptions used to develop EPA's human health risk-based screening levels (RSL) (EPA, 2019). The only exception to this is we assumed an exposure frequency of 124 days per year consistent with NYSDEC (2006) technical guidance, which is based on the assumption that soil contact only occurs during the warmer months of the year defined as the 31-week period from early April to early November, based on the latest date for the first fall frost (after November 10) and the earliest date for the last spring frost (April 10) in New York. Consistent with NYSDEC (2006) technical guidance, we assumed an outdoor

worker may contact soil at the AOCs four days per week for eight hours each day resulting in an assumed soil exposure frequency of 124 days per year.

An outdoor worker may be exposed to COPCs in soil from incidental ingestion, dermal absorption, and inhalation of fugitive dust. We assumed an outdoor worker may be exposed to soil 124 days per year, for up to 25 years. We assumed an outdoor worker ingests 100 mg/day of soil (EPA, 2019). For the dermal exposure route, we assumed exposed skin surface area for an outdoor worker is 3,527 cm<sup>2</sup>, respectively (EPA, 2019), representative of an outdoor worker exposure scenario where exposed skin includes the face, arms, hands, and lower legs. We assumed an adult skin-soil adherence factor of 0.12 mg/cm<sup>2</sup>, which is the EPA skin-soil adherence factor for an outdoor worker (EPA, 2019).

#### 4.1.2.3 Construction Worker

A construction worker may be exposed to surface soil and subsurface soil (0 to 10 feet bgs) while conducting excavation activities at AOCs. We conservatively evaluated a construction worker at each AOC based on EPA's default construction worker soil exposure assumptions (EPA, 2019). We assumed a construction worker may contact soil at the AOCs five days per week for eight hours each day for a 50-week construction project, consistent with EPA guidance.

A construction worker may be exposed to COPCs in soil from incidental ingestion, dermal absorption, and inhalation of fugitive dust. We assumed a construction worker may be exposed to soil 5 days per week, for up to 50 weeks. We assumed a construction worker ingests 330 mg/day of soil (EPA, 2019). For the dermal exposure route, we assumed exposed skin surface area for a construction worker is 3,527 cm<sup>2</sup>, respectively (EPA, 2019), representative of a construction worker exposure scenario where exposed skin includes the face, arms, hands, and lower legs. We assumed an adult skin-soil adherence factor of 0.3 mg/cm<sup>2</sup>, which is the EPA skin-soil adherence factor for a construction worker (EPA, 2019).

#### 4.1.3 Exposure Points

An exposure point refers to a location of potential contact between a human receptor and contaminated media. The following soil exposure points were evaluated for each AOC in this HHRC:

- Surface soil from 0 to 1 feet bgs for a recreational visitor and an outdoor worker; and
- Surface and subsurface soil from 0 to 10 feet bgs for an outdoor worker and a construction worker.

We assumed a recreational visitor would only have contact with the top one foot of soil and an outdoor worker and construction worker may contact surface and subsurface soil to a depth of 10 feet as a result of landscaping, maintenance, and excavation activities.

#### **4.1.4 Exposure Point Concentrations**

GEI estimated EPCs for each COPC in surface soil and subsurface soil at each AOC. EPCs provide a conservative estimate of the concentration a receptor may come in contact with over the period of exposure. Soil sampling locations provided adequate spatial coverage within each AOC as shown in Figure 1; therefore, we assumed analytical data for the surface soil and subsurface soil exposure points approximates the spatial distribution of chemicals in surface soil (0 to 1 feet bgs) and subsurface soil (0 to 10 feet bgs) within each AOC.

In accordance with EPA risk assessment guidance, to obtain an appropriately conservative estimate of human exposure to COPC concentrations in surface soil (0 to 1 foot bgs) and subsurface soil (0 to 10 feet bgs), we calculated the 95 percent upper confidence limit (95UCL) on the mean as the EPC for each COPC within each AOC using EPA Pro-UCL software (EPA, 2016). The 95UCL on the mean represents an upper-bound average concentration to which a receptor may potentially be exposed. USEPA's ProUCL Version 5.1 software was used to calculate the 95UCL on the mean values. The 95UCL on the mean value recommended by ProUCL was used. Where too few samples or detects were available, the maximum detected concentration was used. Setting soil EPCs for some COPCs equal to the maximum detected concentration will likely overestimate potential exposure to this COPC in surface soil and subsurface soil within each AOC.

Lead was evaluated separately in this HHRC because risk assessment for lead is based on a blood lead level, discussed in more detail in the Risk Characterization Section below. In accordance with EPA (1994) guidance on characterizing risk from exposure to lead, the average, or arithmetic mean soil lead concentration from a representative exposure area was used in this HHRC. Estimated EPCs for each COPC in surface soil (0 to 1 feet bgs) and subsurface soil (0 to 10 feet bgs) are presented in Table 1 for each AOC.

##### **4.1.4.1 Fugitive Dust Exposure Point Concentrations**

In accordance with EPA risk assessment guidance (1989), we assumed receptors at each AOC may inhale COPCs in surface soil that volatilize to ambient air or are re-suspended as fugitive dust during recreational activities. Concentrations of COPCs in fugitive dust and ambient air were modeled based on levels in the soil, because there are no measured concentrations of COPCs in fugitive dust or ambient air for the Site. Soil EPCs were used to model fugitive dust EPCs based on EPA's calculated particulate emission factor (PEF) and ambient air EPCs based on EPA's calculated volatilization factor (VF) using EPA default input parameters.

#### **4.1.5 Quantitative Estimates of Exposure**

The purpose of a quantitative estimate of exposure is to estimate the average daily exposure to each COPC by a receptor for each exposure pathway, averaged over an appropriate time period for non-cancer effects and/or for cancer effects. Doses for ingestion

and dermal pathways are estimated as a daily dose rate per unit body weight (milligrams per kilogram per day [mg/kg-day]). Exposures for inhalation pathways are estimated as a daily exposure (mg/m<sup>3</sup>).

The “Average Daily Dose” (ADD) and “Lifetime Average Daily Dose” [(L)ADD] are the general parameters used to quantify exposure doses for the ingestion and dermal pathways in risk assessments. The ADD is used to characterize long-term non-carcinogenic effects and the (L)ADD, which is averaged over a 70-year human lifetime; is used in estimating potential carcinogenic risks. The “Average Daily Exposure” (ADE) and “Lifetime Average Daily Exposure” [(L)ADE] are the general parameters used to quantify exposure doses for the inhalation pathway in risk assessments. The ADE is used to characterize long-term non-carcinogenic effects and the (L)ADE, which is averaged over a 70-year human lifetime; is used in estimating potential carcinogenic risks.

The EPA RSL Website (2019) ([http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/equations.htm](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/equations.htm)) provides a calculator tool, including risk equations and calculations for ingestion, dermal contact and inhalation exposure routes for a recreational visitor, outdoor worker, and construction worker exposure to soil, which was used to estimate cancer and non-cancer risk for receptors at each AOC in this HHRC. Appendix B provides the risk equation inputs for soil, including exposure assumptions, and chemical specific parameters from the EPA RSL website (EPA, 2019) as well as the risk estimate results generated by the calculator tool for the recreational visitor, outdoor worker, and construction worker, respectively.

## 5. Toxicity Assessment

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The Toxicity Assessment or Dose-Response Assessment is a process that results in a quantitative estimate or index of toxicity for each COPC. For carcinogens, this index is the cancer slope factor (CSF) or unit risk factor (URF). For noncarcinogens, it is the reference dose (RfD) or reference concentration (RfC). There are three categories of dose-response information:

- Toxicity values associated with threshold (non-carcinogenic) health effects;
- Toxicity values associated with carcinogenicity, either from human epidemiological studies or laboratory studies; and
- Absorption factors that are used to relate the toxicity values identified in the literature to the exposure pathways of concern.

Toxicity values are available in many on-line databases and publications. The primary sources for toxicity values used in this evaluation include the following:

- The Integrated Risk Information System (IRIS) from the Environmental Protection Agency (EPA) (<http://www.epa.gov/iris>) (EPA, 2020); and
- USEPA Regional Screening Level (RSL) Tables (EPA, 2019).

### 5.1.1 Carcinogenic Health Effects

CSFs (for ingestion and dermal exposures) or URFs (for inhalation exposure) are used to predict the potential number of excess cancers that will arise in response to lifetime exposure to a chemical. These values are predominantly based on animal bioassay data, although human epidemiological data are preferred and used when available.

In evaluating chemicals for carcinogenicity, EPA developed a two-part assessment involving a weight-of-evidence classification and a quantitative determination of carcinogenic potency (i.e., slope factors and unit risks). The weight-of-evidence classification reflects available data, adequacy of studies, types of studies, and observed responses.

The following classifications are used (EPA, 1986):

- Group A: human carcinogens
- Group B1: probable human carcinogens (limited human data)
- Group B2: probable human carcinogens (sufficient evidence in animals; limited or no evidence in humans)

- Group C: possible human carcinogens (limited evidence in animals; limited or no evidence in humans)
- Group D: not classifiable as to human carcinogenicity
- Group E: evidence of noncarcinogenicity in humans

CSFs and/or URFs have typically been developed for Group A, B1, and B2 carcinogens and some Group C carcinogens. Toxicity summaries for carcinogenic COPCs are available on IRIS (<http://www.epa.gov/iris>) (EPA, 2020). CSFs and URFs for COPCs used in this HHRC are presented in Appendix B as cited on the EPA RSL website (EPA, 2019).

The carcinogenic PAHs included as COPCs in this HHRC are considered carcinogenic by a mutagenic mode of action (EPA, 2019). According to EPA, these COPCs may exhibit a greater effect in early-life versus later-life exposure. Therefore, EPA (2019) provides separate cancer risk equations for mutagens that consider early-life exposures that may result in the occurrence of cancer during childhood and early-life exposures that may contribute to cancers later in life.

### **5.1.2 Noncarcinogenic Health Effects**

Noncarcinogenic effects are assessed by comparing the estimated average daily dose or exposure to the acceptable daily dose, referred to as the RfD or in the case of inhalation exposure, the RfC. The RfD is an estimate (with about an order of magnitude uncertainty) of a daily exposure to a human population, including sensitive subgroups, that is likely to be without an appreciable risk of deleterious effects during a portion of their lifetime, in the case of a subchronic RfD, or during a whole lifetime, in the case of a chronic RfD (EPA, 1989). The RfC is an estimate of the inhalation exposure concentration (with about an order of magnitude uncertainty) to which a human population, including sensitive subgroups, could be exposed without an appreciable risk of deleterious effects during a portion of their lifetime, in the case of a subchronic RfC, or during a whole lifetime, in the case of a chronic RfC (EPA, 1989). Toxicity summaries for noncarcinogenic COPCs are available on IRIS (<http://www.epa.gov/iris>) (EPA, 2020). Chronic RfDs and RfCs used in this HHRC are presented in Appendix B as cited on the EPA RSL website (EPA, 2019).

### **5.1.3 Route-to-Route Extrapolation of Slope Factors and Reference Doses**

CSFs and RfDs for the dermal route of exposure have not been developed by the EPA. As a result, oral CSFs and RfDs are typically used to evaluate dermal exposures to chemicals (EPA, 1989). Following the absorption of chemicals via the oral or dermal routes, their distribution, metabolism, and elimination patterns (biokinetics) are usually assumed independent of the route of absorption. However, in order to use oral toxicity values (i.e., extrapolate toxicological effects from the oral route to the dermal route), it is necessary

to adjust the estimated dermal absorbed dose to account for differences in a chemical's absorption between the oral and dermal routes of exposure.

Chemical-specific absorption factors provided by EPA (2019) are used to account for differences in the absorption of a COPC under assumed exposure conditions at a site relative to the absorption of the COPC under the experimental conditions upon which a toxicity value is based. Chemical-specific absorption factors (ABS) evaluated in this HHRC are provided in Appendix B as cited on the EPA RSL website (EPA, 2019).

Subchronic RfDs and RfCs were used in this risk characterization, where available, to evaluate short-term exposure scenarios identified for the construction worker. These toxicity values were derived based on potential non-carcinogenic effects associated with exposure durations ranging from a few weeks to seven years (EPA, 1989). In the absence of subchronic toxicity values, GEI used chronic toxicity values. However, the use of chronic toxicity values to assess short-term exposure likely overestimates subchronic hazards to receptors of concern. Subchronic RfDs and RfCs used in this HHRC are presented in Appendix B as cited on the EPA RSL website (EPA, 2019).

#### **5.1.4 Risk Characterization for Lead in Soil**

Risk assessment for lead is substantially different than for other COPCs. USEPA does not provide non-cancer toxicity values for lead. Risk assessment for lead is based on a blood lead level. USEPA cleanup levels for lead are derived so that blood lead levels of almost all children exposed would be below levels of concern for blood lead in young children between 6 months and 7 years of age. The USEPA residential soil lead standard for bare soil of play areas and the NYSDEC residential lead SCO is 400 mg/kg. This lead standard was derived using USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model, which relates soil lead levels and blood lead levels in young children. The residential soil lead standard of 400 mg/kg was multiplied by a factor of 1.7 to account for the difference in exposure frequency between a resident exposed 5 days a week and a child recreational visitor exposed 3 days a week at the Site. Therefore, the Site-specific screening level derived for lead in surface soil for a child recreational visitor is 670 mg/kg. Comparison to this derived lead screening level for soil may be a conservative evaluation for AOCs because it is based on residential exposures to soil which is likely to be more intense than exposures to soil in a passive recreational setting. The USEPA and NYSDEC industrial soil lead standard of 800 mg/kg (USEPA, 2019) was considered an acceptable lead screening level for soil for an outdoor worker and a construction worker at the AOCs.



## 6. Risk Characterization

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The characterization of risk is the final step in the risk assessment process. In this step, the toxicity and exposure assessments are combined into quantitative estimates of risk to each human receptor of concern from exposure to COPCs at a site. Human health risk from exposure to COPCs is estimated separately for carcinogenic and noncarcinogenic COPCs:

1. To characterize potential carcinogenic effects, lifetime average daily doses or exposures are compared to chemical-specific CSFs or URFs. Specifically, the estimated lifetime average daily dose or exposure is multiplied by the CSF or URF. Risk is expressed as the probability of that exposure resulting in an excess incidence of cancer; that is, the occurrence of more cancers than would normally be expected in the exposed population.
2. To characterize potential noncarcinogenic effects, average daily doses are compared to chemical-specific RfDs or RfCs. Specifically, the estimated average daily dose or exposure is divided by the RfD or RfC. This ratio is called the Hazard Index.

### 6.1.1 Cumulative Cancer Risk Evaluation

Excess Lifetime Cancer Risk (ELCR) from ingestion (oral), dermal, and inhalation routes of exposure were calculated using the following equation:

$$ELCR = [(\sum ((L)ADD_{ing,derm,inhCl}) \times CSF) + (ADE \times URF)]$$

where:

- ELCR = Excess Lifetime Cancer Risk  
(L)ADD = Lifetime Average Daily Dose  
CSF = Cancer Slope Factor  
ADE = Average Daily Exposure  
URF = Inhalation Unit Risk Factor

### 6.1.2 Cumulative Noncancer Risk Evaluation

Noncancer hazards from ingestion (oral), dermal, and inhalation routes of exposure were calculated using the following equation:

$$HI = ADD \text{ and } DAD / RfD \quad \text{or} \quad HI = ADE / RfC$$

where:

- ADD = Average Daily Dose (mg/kg-day)  
DAD = Dermal Absorbed Dose (mg/kg-day)

RfD = Reference Dose (mg/kg-day)  
ADE = Average Daily Exposure (mg/m<sup>3</sup>)  
RfC = Reference Concentration (mg/m<sup>3</sup>)

To estimate potential cumulative noncancer risk, chemical-specific HIs for a receptor are summed to derive a Total Hazard Index (THI). The resulting THI is an indicator of noncancer risk to a receptor. The THI is considered a conservative index to evaluate noncancer risk because it represents the sum of all chemical-specific HIs and assumes that their risks are additive, when, in fact, different COPCs are expected to act through different mechanisms and on different target organs. A THI below one is useful to rapidly exclude exposure scenarios with negligible potential for non-cancer effects. A THI above one indicates that exposure could be higher than the “no-effect” dose or exposure represented by the RfD or RfC.

### **6.1.3 Cumulative Cancer/Noncancer Risk Limits**

For cumulative cancer risk estimates for all COPCs and exposure routes of concern combined, EPA established an acceptable cancer risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  used to manage risk at sites. A cancer risk of  $1 \times 10^{-4}$  indicates a probability of 1 in 10,000 of an individual developing cancer, and a cancer risk of  $1 \times 10^{-6}$  indicates a probability of 1 in 1,000,000 of an individual developing cancer. For cumulative cancer risk, this acceptable risk range is generally interpreted to mean that risks in excess of  $1 \times 10^{-4}$  are likely to pose unacceptable risk to human health, and that risks that fall within the range of  $1 \times 10^{-4}$  and  $1 \times 10^{-6}$  are defined by EPA to be within an acceptable risk range. According to EPA and NYDEC, a non-cancer risk less than 1 is considered acceptable therefore when the THI for a receptor is below one, non-cancer risk is considered acceptable.

### **6.1.4 Cancer and Non-Cancer Risk Summary**

Cumulative cancer and non-cancer risk estimates and risk from exposure to lead in soil are discussed below for each AOC. Table 2 presents cumulative cancer and non-cancer risk estimates for a child and adult recreational visitor and an outdoor worker exposed to surface soil (0 to 1 feet bgs) at each AOC and Table 3 presents cumulative cancer and non-cancer risk estimates for an outdoor worker and construction worker exposed to surface and subsurface soil (0 to 10 feet bgs) at each AOC. Appendices B-1 through B-5 provide the risk estimate results generated by the EPA RSL calculator tool (EPA, 2019) for the recreational visitor, outdoor worker, and construction worker for each AOC.

#### **6.1.4.1 Area D AOC**

**Recreational Visitor.** The cumulative cancer risk estimated for a recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area D AOC ( $2 \times 10^{-5}$ ) is within EPA’s acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for a child and adult recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the

Area D AOC (1 and 0.1, respectively) does not exceed the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Area D AOC (228 mg/kg) is below the derived lead soil screening level of 670 mg/kg for a recreational visitor. Therefore, this HHRC concluded no risk to a recreational visitor from exposure to surface soil at the Area D AOC.

**Outdoor Worker.** The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area D AOC ( $3 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area D AOC (0.1) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Area D AOC (228 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface soil at the Area D AOC.

The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area D AOC ( $4 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area D AOC (0.3) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and subsurface soil (0 to 10 feet bgs) at the Area D AOC (258 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface and subsurface soil at the Area D AOC.

**Construction Worker.** The cumulative cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area D AOC ( $1 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area D AOC (2) exceeds the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and subsurface soil (0 to 10 feet bgs) at the Area D AOC (258 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded a non-cancer risk to a construction worker from exposure to surface and subsurface soil at the Area D AOC. Risk to a construction worker at this AOC is primarily attributable to exposure to DDD, aroclor 1254, antimony, and manganese in subsurface soil. Figure 3 presents a Soil Management Plan, which identifies the need for an Excavation Plan at the Area D AOC to mitigate risk to a construction worker from exposure to surface and subsurface soil (0 to 10 feet bgs).

#### 6.1.4.2 Area C – Cottonwood Copse AOC

**Recreational Visitor.** The cumulative cancer risk estimated for a recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area C – Cottonwood Copse AOC ( $6 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk

estimated for a child and adult recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area C – Cottonwood Copse AOC (0.6 and 0.06, respectively) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Area C – Cottonwood Copse AOC (93 mg/kg) is below the derived lead soil screening level of 670 mg/kg for a recreational visitor. Therefore, this HHRC concluded no risk to a recreational visitor from exposure to surface soil at the Area C – Cottonwood Copse AOC.

**Outdoor Worker.** The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area C – Cottonwood Copse AOC ( $2 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area C – Cottonwood Copse AOC (0.1) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Area C – Cottonwood Copse AOC (93 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface soil at the Area C – Cottonwood Copse AOC.

The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area C – Cottonwood Copse AOC ( $2 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area C – Cottonwood Copse AOC (0.1) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and subsurface soil (0 to 10 feet bgs) at the Area C – Cottonwood Copse AOC (68 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface and subsurface soil at the Area C – Cottonwood Copse AOC.

**Construction Worker.** The cumulative cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area C – Cottonwood Copse AOC ( $5 \times 10^{-7}$ ) is below EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area C – Cottonwood Copse AOC (0.4) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and subsurface soil (0 to 10 feet bgs) at the Area C – Cottonwood Copse AOC (68 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to a construction worker from exposure to surface and subsurface soil at the Area C -Cottonwood Copse AOC.

#### 6.1.4.3 Area C – South and East of Cottonwood Copse AOC

**Recreational Visitor.** The cumulative cancer risk estimated for a recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area C – South and East of

Cottonwood Copse AOC ( $6 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for a child and adult recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area C – South and East of Cottonwood Copse AOC (0.8 and 0.1, respectively) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Area C – South and East of Cottonwood Copse AOC (163 mg/kg) is below the derived lead soil screening level of 670 mg/kg for a recreational visitor. Therefore, this HHRC concluded no risk to a recreational visitor from exposure to surface soil at the Area C – South and East of Cottonwood Copse AOC.

**Outdoor Worker.** The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area C – South and East of Cottonwood Copse AOC ( $2 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Area C – South and East of Cottonwood Copse AOC (0.1) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Area C – South and East of Cottonwood Copse AOC (163 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface soil at the Area C – South and East of Cottonwood Copse AOC.

The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area C – South and East of Cottonwood Copse AOC ( $2 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area C – South and East of Cottonwood Copse AOC (0.1) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and subsurface soil (0 to 10 feet bgs) at the Area C – South and East of Cottonwood Copse AOC (336 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface and subsurface soil at the Area C- South and East of Cottonwood Copse AOC.

**Construction Worker.** The cumulative cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area C – South and East of Cottonwood Copse AOC ( $4 \times 10^{-7}$ ) is below EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Area C – South and East of Cottonwood Copse AOC (0.6) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and subsurface soil (0 to 10 feet bgs) at the Area C – South and East of Cottonwood Copse AOC (336 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to a construction

worker from exposure to surface and subsurface soil at the Area C – South and East of Cottonwood Copse AOC.

#### 6.1.4.4 Bell Slip AOC

**Recreational Visitor.** The cumulative cancer risk estimated for a recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Bell Slip AOC ( $1 \times 10^{-5}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for a child and adult recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Bell Slip AOC (1 and 0.1, respectively) does not exceed the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Bell Slip AOC (331 mg/kg) is below the derived lead soil screening level of 670 mg/kg for a recreational visitor. Therefore, this HHRC concluded no risk to a recreational visitor from exposure to surface soil at the Bell Slip AOC.

**Outdoor Worker.** The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Bell Slip AOC ( $3 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Bell Slip AOC (0.2) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Bell Slip AOC (331 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface soil at the Bell Slip AOC.

The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Bell Slip AOC ( $5 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Bell Slip AOC (0.3) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and subsurface soil (0 to 10 feet bgs) at the Bell Slip AOC (640 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface and subsurface soil at the Bell Slip AOC.

**Construction Worker.** The cumulative cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Bell Slip AOC ( $1 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Bell Slip AOC (2) exceeds the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and subsurface soil (0 to 10 feet bgs) at the Bell Slip AOC (640 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded a non-cancer risk to a construction worker from exposure to surface and subsurface soil at the Bell Slip AOC. Risk to a construction

worker at this AOC is primarily attributable to exposure to DDD, aroclor 1254, antimony, and manganese in subsurface soil. Figure 3 presents a Soil Management Plan, which identifies the need for an Excavation Plan at the Bell Slip AOC to mitigate risk to a construction worker from exposure to surface and subsurface soil (0 to 10 feet bgs).

#### 6.1.4.5 Wilkeson Pointe – Undeveloped Portion AOC

**Recreational Visitor.** The cumulative cancer risk estimated for a recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Wilkeson Pointe – Undeveloped Portion AOC ( $9 \times 10^{-5}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for a child recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Wilkeson Pointe – Undeveloped Portion AOC (2) exceeds the EPA and NYSDEC non-cancer risk limit of 1. The non-cancer risk estimated for an adult recreational visitor exposed to COPCs in surface soil (0 to 1 feet bgs) at the Wilkeson Pointe – Undeveloped Portion AOC (0.2) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Wilkeson Pointe – Undeveloped Portion AOC (754 mg/kg) exceeds the derived lead soil screening level of 670 mg/kg for a recreational visitor. Therefore, this HHRC concluded a non-cancer risk to a child recreational visitor from exposure to surface soil at the Wilkeson Pointe – Undeveloped Portion AOC. Risk to a child recreational visitor at this AOC is primarily attributable to exposure to benzo(a)pyrene, manganese, thallium, and lead in surface soil. Figure 3 presents a Soil Management Plan, which identifies the need for cover material or institutional controls such as fencing at the Wilkeson Pointe – Undeveloped Portion AOC to mitigate risk to a recreational visitor from exposure to surface soil (0 to 1 feet bgs).

**Outdoor Worker.** The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Wilkeson Pointe – Undeveloped Portion AOC ( $1 \times 10^{-5}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface soil (0 to 1 feet bgs) at the Wilkeson Pointe – Undeveloped Portion AOC (0.2) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface soil (0 to 1 feet bgs) at the Wilkeson Pointe – Undeveloped Portion AOC (754 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface soil at the Wilkeson Pointe – Undeveloped Portion AOC.

The cumulative cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Wilkeson Pointe - Undeveloped Portion AOC ( $8 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for an outdoor worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Wilkeson Pointe - Undeveloped Portion AOC (0.1) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and

subsurface soil (0 to 10 feet bgs) at the Wilkeson Pointe - Undeveloped Portion AOC (615 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to an outdoor worker from exposure to surface and subsurface soil at the Wilkeson Pointe - Undeveloped Portion AOC.

**Construction Worker.** The cumulative cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Wilkeson Pointe - Undeveloped Portion AOC ( $2 \times 10^{-6}$ ) is within EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The non-cancer risk estimated for a construction worker exposed to COPCs in surface and subsurface soil (0 to 10 feet bgs) at the Wilkeson Pointe - Undeveloped Portion AOC (0.8) is below the EPA and NYSDEC non-cancer risk limit of 1. The average lead concentration in surface and subsurface soil (0 to 10 feet bgs) at the Wilkeson Pointe - Undeveloped Portion AOC (615 mg/kg) is below the EPA and NYSDEC industrial soil lead standard of 800 mg/kg. Therefore, this HHRC concluded no risk to a construction worker from exposure to surface and subsurface soil at the Wilkeson Pointe - Undeveloped Portion AOC.



## 7. Uncertainty Analysis

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This analysis includes a discussion of potential sources of uncertainty associated with the risk characterization, including data gaps in toxicological or exposure assessment information as well as conservative assumptions or scientific judgments used to bridge these data gaps. Numerical estimates of risk to human health presented in this report are only as good as the data and information upon which they are based. General sources of variability and uncertainty in the risk characterization include measurement errors in the site assessment process, variability in natural system and human behavior, limitations in model simplifications and assumptions, limitations in literature-derived data, and professional judgment used to select parameters. To address the inherent uncertainty in this analysis, this HHRC errs on the side of caution (i.e., is potentially more protective) in the hazard identification, exposure and toxicity assessments, and the characterization of risk. The degree of conservatism built into the HHRC is generally proportional to the amount of uncertainty.

A discussion of the uncertainty and conservatism associated with the risk characterization is provided in this section to facilitate an understanding of the strengths and limitations of the risk characterization.

### 7.1 Uncertainties in Hazard Identification

The number and distribution of soil samples collected at each AOC are considered reasonable for the COPCs. Previous investigations conducted at the Site adequately characterized the contamination in soil and included an adequate sampling frequency. In addition, the 95UCL concentrations in soil or the maximum concentrations in soil for COPCs in applicable samples were selected for the EPCs. These are conservative estimates of EPCs to account for potential uncertainty associated with the characterization of soil at each AOC.

### 7.2 Uncertainties in Exposure Assessment

Conservative exposure parameters are incorporated in the exposure assessment. Health-protective exposure assumptions based on either Site-specific information or conservative default values consistent with EPA RSL calculations were used to quantitatively evaluate potential risk.

With respect to determining EPCs, one assumption was that the concentrations of chemicals in the medium evaluated would remain constant over time. Depending on the properties of the chemical and the medium in which it was detected, this assumption may overestimate risks because chemicals may degrade over time.

## **7.3 Uncertainties in Toxicity Assessment**

There are many uncertainties inherent in the toxicity values used in the dose-response assessment. For example, short-term, homogeneous animal studies, using very high concentrations, are used to predict human health effects resulting from low-dose exposures over long exposure periods. Conservative safety factors are incorporated in the toxicity values to counter this uncertainty. Compounding conservative safety factors may result in the overestimation of risk.

### **7.3.1 Carcinogenic Toxicity Assessment Assumptions**

Carcinogenic COPCs have been evaluated by the EPA using a weight-of-evidence carcinogenicity evaluation criteria, and some have been placed in Group A (human carcinogens) or Group B (probable human carcinogens), based on sufficient data in humans, or sufficient data in animals and insufficient data in humans, respectively (EPA, 1986). There is uncertainty introduced in the assessment where COPCs are currently under review by EPA to change their weight-of-evidence classifications, which pending these classifications may result in either under- or over-estimation of cancer risk.

### **7.3.2 Non-carcinogenic Toxicity Assessment Assumptions**

Key assumptions used in assessing the likelihood of non-carcinogenic effects are that threshold doses exist below which various non-carcinogenic effects do not occur and that the occurrence or absence of non-carcinogenic effects can be extrapolated between species and occasionally between routes of exposure over varying exposure durations. The threshold assumption appears to be sound for most non-carcinogens based on reasonably good fits of experimental data to dose-response curves.

The effects observed in one species or by one route of exposure may not occur in another species or by another route, or they may occur at a higher or lower dose due to differences in the biokinetics of a compound in different species. The uncertainty in these assumptions is taken into account in the development of RfDs using safety or uncertainty factors. These factors reflect uncertainty associated with species-to-species extrapolation and include safety factors to protect sensitive individuals. In addition to uncertainty factors, a modifying factor is applied to reflect a quantitative professional assessment of additional uncertainties in the critical study and in the entire database for the chemical not explicitly addressed by other uncertainty factors. The incorporation of safety factors and a modifying factor result in lowering the acceptable dose or risk level (i.e., making the value more conservative).

The uncertainty factors and modifying factors incorporated in the RfDs and RfCs are conservative (health protective) in nature. The use of these toxicity values therefore may overestimate the potential for non-carcinogenic effects for a given exposure route.

### **7.3.3 *Route-to-Route Extrapolation of Slope Factors and Reference Doses***

Route-to-route extrapolation of toxicity values adds an additional source of uncertainty to the risk assessment. Such extrapolation may result in either under- or over-estimation of the true risks for the extrapolated route. Although this practice adds uncertainty to the risk evaluation, it is preferable to omitting exposure to a COPC by a route for which no toxicity value is available thus avoiding the potential underestimation of risk.

## **7.4 Uncertainties in Risk Characterization**

The estimation of ELCR assumes that an increased risk of cancer from exposure to a chemical is directly proportional to the chemical intake averaged over a lifetime with no threshold or (non-zero) dose below which carcinogenic effects do not occur. While continuing to recommend this approach, EPA recognizes that certain carcinogenic chemicals may have threshold levels similar to non-carcinogenic chemicals (EPA, 2005). In addition, cumulative cancer and non-cancer risk estimates assume risks are additive, which may under-estimate or over-estimate risk given that some chemical effects may not be additive, while others may have synergistic effects.

## 8. Summary and Conclusions

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This HHRC quantified risk to human health at the Site, defined as the portion of the Buffalo Outer Harbor, located west of Fuhrmann Boulevard and comprising the area from the newly constructed bike park to the south and Wilkeson Pointe Park to the north. The Site excludes the Greenway Nature Trail Easement located along the Lake Erie shoreline adjacent to the Site, which was constructed with a cover system under the NYSDEC Brownfield Cleanup Program. This HHRC characterized risk to human health from potential exposure to residual contamination in surface and subsurface soil at the following five AOCs:

- Area D
- Area C – Cottonwood Copse
- Area C – South and East of Cottonwood Copse
- Bell Slip
- Wilkeson Pointe – Undeveloped Portion

The results of the HHRC inform decisions regarding proposed redevelopment and the need to implement engineering controls or institutional controls to prevent exposure of future Site users and workers to remaining soil contamination. This HHRC concluded the following:

- There is no risk to the child and adult recreational visitor from exposure to surface soil (0 to 1 feet bgs) through incidental ingestion, dermal contact, and inhalation at the following AOCs evaluated in this HHRC: Area C – Cottonwood Copse AOC, Area C – South and East of Cottonwood Copse AOC, Bell Slip AOC, and Area D AOC.
- There is non-cancer risk to a child recreational visitor from exposure to surface soil (0 to 1 feet bgs) through incidental ingestion, dermal contact, and inhalation at the Wilkeson Pointe – Undeveloped Portion AOC. This AOC includes the undeveloped northeastern portion of Wilkeson Pointe, currently covered with grass and trees and where a clean soil cover was not previously applied. Risk to a child recreational visitor at this AOC is primarily attributable to exposure to benzo(a)pyrene, manganese, thallium, and lead in surface soil. Risk to a recreational visitor at this AOC will be mitigated by institutional controls such as fencing implemented as part of the Site Management Plan to limit access (Figure 3). Wilkeson Pointe Park to the west of the undeveloped portion was already redeveloped with a 1-foot clean soil cover system.
- There is non-cancer risk to a construction worker from exposure to surface and subsurface soil (0 to 10 feet bgs) through incidental ingestion, dermal contact, and inhalation at the Bell Slip AOC and the Area D AOC. Risk to a construction worker

at these AOCs is primarily attributable to exposure to DDD, aroclor 1254, antimony and manganese. Risk to a construction worker will be mitigated by controls implemented as part of the Site Management Plan and Excavation Work Plan (Figure 3).

- There is no risk to the construction worker from exposure to surface and subsurface soil (0 to 10 feet bgs) through incidental ingestion, dermal contact, and inhalation at the following AOCs evaluated in this HHRC: Wilkeson Pointe – Undeveloped Portion AOC, Area C – Cottonwood Copse AOC, and Area C – South and East of Cottonwood Copse AOC.
- There is no risk to the outdoor worker from exposure to surface and subsurface soil (0 to 10 feet bgs) through incidental ingestion, dermal contact, and inhalation at all the AOCs evaluated in this HHRC, including the Wilkeson Pointe - Undeveloped Portion AOC, Area C – Cottonwood Copse AOC, Area C – South and East of Cottonwood Copse AOC, Bell Slip AOC, and Area D AOC.

Risk management strategies recently implemented at the Area D AOC include both engineering controls and institutional controls. The Site Management Plan for Area D prepared by LiRo (2019) outlines specific controls implemented at Area D to mitigate exposure to surface and subsurface soil during recreational use. Specifically, a cover system was installed in areas being re-used for recreation, including 2-feet of clean cover material for active recreational use areas such as the bike park and mountain biking trails and 1-foot of clean cover material for passive recreational use areas such as walkways and lawn areas. In addition, the Site Management Plan outlines institutional controls implemented at Area D to mitigate exposure to surface and subsurface soil during recreational use. Specifically, institutional controls include fencing to limit access to uncovered vegetative areas, an excavation work plan to mitigate risk to construction workers during excavation projects, and an inspection/monitoring plan to enforce restricted uses and maintain cover systems. These risk management strategies will be implemented at all the AOCs as needed during redevelopment of the Site for recreational use.

## 9. References

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# Tables

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Table 1  
 Summary of Soil Chemicals of Potential Concern (COPC) and Exposure Point Concentrations  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Soil COPC	Area D AOC		Area C - Cottonwood Copse AOC		Area C - South and East of Cottonwood Copse AOC		Bell Slip AOC		Wilkeson Pointe - Undeveloped Portion AOC	
	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil	Surface Soil	Subsurface Soil
<b>Metals</b>										
Aluminum	10,300	9,530	11,200	10,204	12,705	9,311	19,700	15,800	14,907	11,581
Antimony	2.9	40.5	7.59	6.79	4.6	8.65	4.44	8.67	2.3	5.04
Arsenic	8.54	8.01	3.85	3.64	9.3	8.61	14	15.5	10.6	11.04
Barium	153	168	147	94.8	237	319	371	587	358	306
Cadmium	4.02	4.16	1.35	0.8	3.85	2.95	8.84	5.86	--	--
Chromium	53.6	48.9	93.5	55.8	63.12	35.3	237	189	21.63	25.09
Cobalt	4.57	4.44	4.88	20.8	4.88	12.38	4.72	4.81	9.99	7.18
Copper	282	89.3	84	112	294	351	989	743	80.17	278
Lead	228	258	93.43	67.7	163	336	331	640	754	615
Manganese	1,090	1,160	813	783	1,308	1,055	1,630	1,250	2,275	1,089
Mercury	0.38	0.43	0.33	0.22	0.35	0.45	0.54	0.36	0.82	0.59
Silver	3.48	1.71	--	--	--	--	8.23	10.3	--	--
Thallium	2.68	2.35	1.85	2.59	1.85	1.55	2.65	2.27	3.5	1.57
Vanadium	21.3	20.1	--	--	--	--	20.2	20.6	--	--
Zinc	729	644	135	111	525	1,088	1,120	1,240	--	--
<b>SVOCs / PAHs</b>										
Benz(a)anthracene	3.46	2.64	0.77	0.49	0.8	0.84	1.89	4.2	26.69	18.25
Benzo(b)fluoranthene	3.52	2.63	0.75	0.5	1	0.99	2.38	4.07	27.61	19.02
Benzo(k)fluoranthene	2.31	1.39	0.54	0.4	0.53	0.61	1.03	1.93	12.24	7.68
Benzo(a)pyrene	2.92	2.23	0.35	0.29	0.77	0.82	1.73	3.55	25.76	17.9
Chrysene	2.97	2.29	0.84	0.55	0.83	0.89	1.89	3.81	24.81	16.34
Dibenz(a,h)anthracene	0.79	0.63	0.39	0.17	0.18	0.21	0.45	1.49	3.85	2.5
Indeno(1,2,3-cd)pyrene	2.51	1.44	0.3	0.23	0.51	0.51	1.32	2.5	17.87	11.43
Phenanthrene	12.5	7.09	--	--	--	--	3	10.4	--	--
Hexachlorobenzene	ND	0.48	--	--	--	--	--	--	--	--
N-nitrosodiphenylamine	--	--	ND	0.34	--	--	--	--	--	--
<b>PCBs</b>										
Aroclor 1248	0.25	0.75	--	--	--	--	--	--	--	--
Aroclor 1254	0.7	1.1	--	--	--	--	0.44	0.27	--	--
Aroclor 1260	0.21	0.28	1.67	1.67	--	--	0.17	0.13	--	--
<b>Pesticides</b>										
Aldrin	0.007	0.015	--	--	--	--	--	--	--	--
DDT	0.054	3.48	--	--	--	--	0.015	12.9	--	--
DDD	0.054	3.22	--	--	--	--	0.008	4.43	--	--
Endrin	0.024	0.66	--	--	--	--	0.013	0.93	--	--

- Notes:
- (a) Soil EPCs in units of mg/kg.
  - (b) EPCs set equal to the 95UCL soil concentration or the maximum soil concentration if lower than the 95UCL value.
  - (c) Lead EPCs based on average lead concentration in soil.
  - (d) "--" = Not a COPC
  - (e) "ND" = Not detected

Table 2  
 Summary of Human Health Cancer and Non-Cancer Risk from Exposure to Surface Soil (0 to 1 feet bgs)  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Receptor	Excess Lifetime Cancer Risk (ELCR)						Total Hazard Index (THI)				
	Area D AOC	Area C - Cottonwood Copse AOC	Area C - South and East of Cottonwood Copse AOC	Bell Slip AOC	Wilkeson Pointe - Undeveloped Portion AOC		Area D AOC	Area C - Cottonwood Copse AOC	Area C - South and East of Cottonwood Copse AOC	Bell Slip AOC	Wilkeson Pointe - Undeveloped Portion AOC
Recreational Visitor	2x10 <sup>-5</sup>	6x10 <sup>-6</sup>	6x10 <sup>-6</sup>	1x10 <sup>-5</sup>	9x10 <sup>-5</sup>	Child	1	0.6	0.8	1	<b>2</b>
						Adult	0.1	0.06	0.1	0.1	0.2
Outdoor Worker	3x10 <sup>-6</sup>	2x10 <sup>-6</sup>	2x10 <sup>-6</sup>	3x10 <sup>-6</sup>	1x10 <sup>-5</sup>	Adult	0.1	0.1	0.1	0.2	0.2

Notes:

1. Bolded values exceed Cancer Risk Limit Range of 1x10<sup>-4</sup> to 1x10<sup>-6</sup> and/or Non-cancer Risk Limit of 1.

Table 3  
 Summary of Human Health Cancer and Non-Cancer Risk from Exposure to Surface and Subsurface Soil (0 to 10 feet bgs)  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Receptor	Excess Lifetime Cancer Risk (ELCR)					Total Hazard Index (THI)				
	Area D AOC	Area C - Cottonwood Copse AOC	Area C - South and East of Cottonwood Copse AOC	Bell Slip AOC	Wilkeson Pointe - Undeveloped Portion AOC	Area D AOC	Area C - Cottonwood Copse AOC	Area C - South and East of Cottonwood Copse AOC	Bell Slip AOC	Wilkeson Pointe - Undeveloped Portion AOC
Outdoor Worker	4x10 <sup>-6</sup>	2x10 <sup>-6</sup>	2x10 <sup>-6</sup>	5x10 <sup>-6</sup>	8x10 <sup>-6</sup>	0.3	0.1	0.1	0.3	0.1
Construction Worker	1x10 <sup>-6</sup>	5x10 <sup>-7</sup>	4x10 <sup>-7</sup>	1x10 <sup>-6</sup>	2x10 <sup>-6</sup>	<b>2.0</b>	0.4	0.6	<b>2.0</b>	0.8

Notes:

1. Bolded values exceed Cancer Risk Limit Range of 1x10<sup>-4</sup> to 1x10<sup>-6</sup> and/or Non-cancer Risk Limit of 1.

# Figures

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**AREAS OF CONCERN (AOC):**

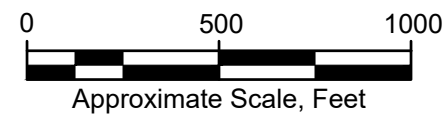
- WILKESON POINTE - UNDEVELOPED PORTION
- AREA C - COTTONWOOD COPSE
- AREA C - SOUTH AND EAST OF COTTONWOOD COPSE
- AREA C/D - BELL SLIP
- AREA D

**LEGEND:**

- SURFACE AND/OR SUBSURFACE SOIL SAMPLE LOCATION
- GREENWAY NATURE TRAIL EASEMENT

**NOTES:**

1. ALL LOCATIONS ARE APPROXIMATE.
2. BASE IMAGE PROVIDED BY THE LiRo GROUP ON 2/11/2020.



Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

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Buffalo, New York



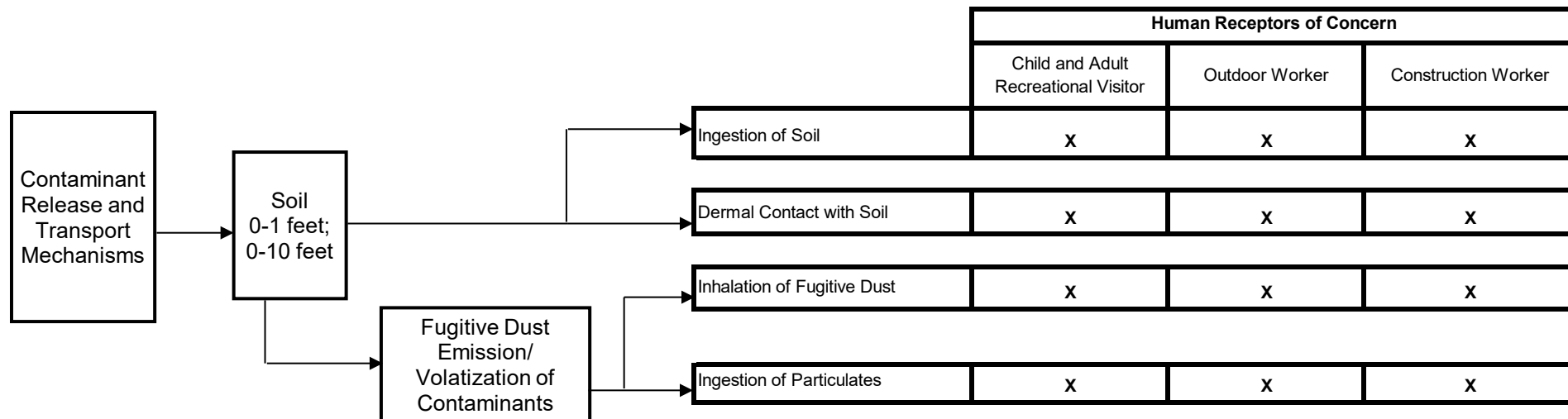
AREAS OF CONCERN (AOC)  
FOR HUMAN HEALTH RISK  
ASSESSMENT

Project 1905693

September 2020

Fig. 1

**Figure 2**  
**Conceptual Site Model for Human Exposure Pathways**  
**Human Health Risk Characterization**  
**Buffalo Outer Harbor**  
**Buffalo, New York**



**Key**

X - Complete or Potentially Complete Exposure Pathway  
 O - Incomplete Exposure Pathway  
 → Exposure Route



**AREAS OF CONCERN (AOC):**

- WILKESON POINTE - UNDEVELOPED PORTION
- AREA C - COTTONWOOD COPSE
- AREA C - SOUTH AND EAST OF COTTONWOOD COPSE
- AREA C/D - BELL SLIP
- AREA D

**SOIL MANAGEMENT LEGEND:**

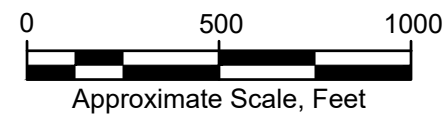
- COVER MATERIAL OR INSTITUTIONAL CONTROLS REQUIRED TO MITIGATE RISK TO A RECREATIONAL VISITOR FROM EXPOSURE TO SURFACE SOIL (0 TO 1-FOOT BELOW GROUND SURFACE (BGS))
- SOIL MANAGEMENT PLAN (SMP) REQUIRED TO MITIGATE RISK TO A CONSTRUCTION WORKER FROM EXPOSURE TO SURFACE AND SUBSURFACE SOIL (0 TO 10-FEET BGS)

**LEGEND:**

- SURFACE AND/OR SUBSURFACE SOIL SAMPLE LOCATION
- GREENWAY NATURE TRAIL EASEMENT

**NOTES:**

1. ALL LOCATIONS ARE APPROXIMATE.
2. BASE IMAGE PROVIDED BY THE LiRo GROUP ON 2/11/2020.



Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

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Buffalo, New York



Project 1905693

SOIL MANAGEMENT PLAN

September 2020

Fig. 3

# Appendix A

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## Soil Analytical Data

Appendix A-1 Area D AOC

Appendix A-2 Area C – Cottonwood Copse AOC

Appendix A-3 Area C – South and East of Cottonwood Copse AOC

Appendix A-4 Bell Slip AOC

Appendix A-5 Wilkeson Pointe - Undeveloped Portion AOC



## *Appendix A-1 Area D AOC*

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SB5-1-6	D-SB6-1-6	D-SB7-1-6	D-SB10-1-6	D-SB11-1-6	D-SB12-1-6	D-SB13-1-6	D-SB14-1-6	D-SB15-1-6	D-SB8-1-6	D-SB9-1-6	D-SB16-1-6
Start Depth	1	1	1	1	1	1	1	1	1	1	1	1
End Depth	6	6	6	6	6	6	6	6	6	6	6	6
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/21/2017	8/21/2017	8/21/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/23/2017
Analyte												
Aluminum	9950	9160	17600	7560	13000	6490	9890	7630	6380	9680	6250	5420
Antimony	189	10.7	1.4 J	0	0	0	0	0	0	1.7 J	0	0
Arsenic	17	19.1	18.4	5.1	4.6	6	5	6.3	2.9	12.7	4.3	6.2
Barium	1530	305	381	87.2	128	115	64.7	178	59	216	90.6	81.9
Beryllium	0.94	0.81	2.75	0.64	1.47	0.43	0.6	0.46	0.9	0.72	0.33	0.42
Cadmium	26.2	2.48	1.18	0.46 J	0.23 J	0.46 J	0.23 J	0.48 J	0.29 J	0.73	0.3 J	0.83
Calcium	54900	83200	93900	100000	67800	33600	91000	44000	91700	47200	43700	47200
Chromium	97.8	98.3	17.9	117	11.9	11.6	9.3	13.4	8.4	38.3	9.6	22.5
Hexavalent Chromium (Cr VI)												
Cobalt	6.3	6.2	3 J	3.6 J	3.9 J	5 J	3.2 J	4.5 J	1.8 J	5.6 J	2.9 J	3.5 J
Copper	183	162	155	34.2	28.8	42.4	23.4	48	15.7	74.7	15.1	68.3
Total Cyanide												
Iron	59400	31200	25700	39800	12700	21700	10500	15500	8440	24000	10600	13200
Lead	3400	258	452	102	51.6	113	210	687	44	307	447	96.6
Magnesium	7910	6720	10900	14200	10300	9340	21400	7460	18800	6780	11100	14500
Manganese	783	2380	1960	2440	1800	272	311	265	495	955	285	424
Mercury	0	0.235	0.356	0.245	0.131	0.441	0.119	0.12	0.076	0.297	0.187	0.093
Nickel	24.7	16.8	12.4	17.7	12.3	12.4	8.3	12.6	6.1	16.6	7.2	10
Potassium	1090	1290	1300	1160	1330	1360	1330	1090	870	1420	910	770
Selenium	3.1	3.2	3.6	1.9	1.3	0.9 J	0.6 J	0.6 J	0.7 J	1.5	0	0.7 J
Silver	0.4 J	0.6 J	0.4 J	0.09 J	0	0.1 J	0	0	0	1.2 J	0.07 J	0.4 J
Sodium	1310	450	640	270	390	180	320	310	330	400	210	260
Thallium	0	2.6	0	0.8 J	0	0	0	0	1.9	0	0	0
Vanadium	36.6	65.7	16.4	47.9	14.4	15.9	13.6	18.1	13.3	23	14.3	11.5
Zinc	1270	603	179	143	98.7	118	77.1	219	65.6	261	110	220
Aroclor 1248	0	0	0	0	0	0	0	0	0	0	0	0
Aroclor 1254	0	0	0	0	0	0	0	0	0	0	0	0
Aroclor 1260	0	0	0	0.022 J	0.77	0.037 J	0	0.027 J	0.087	0.03 J	0.058	0
Aldrin	0	0	0	0	0	0	0	0	0	0	0	0
delta-BHC												
alpha-Chlordane	0	0	0	0.0067 J	0	0	0	0	0	0	0	0
4,4'-DDT (p,p'-DDT)	0	0	54	0	0.076	0	0.014 B	0	0.0066 BJ	0.0084 J	0	0
4,4'-DDE (p,p'-DDE)	0	0	0	0	0	0	0.01	0	0	0	0	0
4,4-DDD (p,p-DDD)	0	0	18	0	0	0	0	0	0	0	0	0
Dieldrin	0	0	0	0	0.029	0	0	0	0	0	0	0
beta-Endosulfan (II)	0	0	0	0	0	0	0	0	0	0	0	0
Endrin	0	0	10	0	0	0	0	0	0	0	0	0
Lindane	0	0	0	0	0	0	0	0	0	0	0	0
Acenaphthene	0	0	0.12 J	1.2 J	0	0.43 J	0	0	0	0	0.93 J	0
Acenaphthylene	0	0	0.2 J	0	0	0.27 J	0	0	0	0.1 J	0	0
Anthracene	0	0	0.47	3.4	0	1.3	0.1 J	0.19 J	0.11 J	0.33 J	3.6	0.25 J
Benzo(a)anthracene	0.86 J	0.85 J	1.6	4.8	1.1 J	3.3	0.29 J	0.58	0.31 J	0.93	4.6	0.75

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB5-1-6	D-SB6-1-6	D-SB7-1-6	D-SB10-1-6	D-SB11-1-6	D-SB12-1-6	D-SB13-1-6	D-SB14-1-6	D-SB15-1-6	D-SB8-1-6	D-SB9-1-6	D-SB16-1-6
Start Depth	1	1	1	1	1	1	1	1	1	1	1	1
End Depth	6	6	6	6	6	6	6	6	6	6	6	6
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/21/2017	8/21/2017	8/21/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/23/2017
Benzo(b)fluoranthene	1 J	1 J	2.1	4.7	1.1 J	3.8	0.37	1	0.37 J	1	4.1	0.87
Benzo(k)fluoranthene	0	0	0.66	1.8 J	0	1.4	0.13 J	0.32 J	0.13 J	0.35 J	1.5	0.29 J
Benzo(g,h,i)perylene	0.51 J	0.48 J	0.74	1.9	0.57 J	1.6	0.19 J	0.75	0.18 J	0.54	1.5	0.45 J
Benzo(a)pyrene	0.82 J	0.82 J	1.6	4.1	1.2 J	3.2	0.31 J	0.94	0.31 J	0.92	3.6	0.68 J
Chrysene	0.81 J	0.87 J	1.9	4.1	1.1 J	3.1	0.29 J	0.62	0.3 J	0.88	3.9	0.73
Dibenz(a,h)anthracene	0	0	0.22 J	0.6 J	0	0.46 J	0	0.16 J	0	0.14 J	0.55 J	0
Dibenzofuran	0	0	0.13 J	0.89 J	0	0.31 J	0	0	0	0	1.3	0
Fluoranthene	1.6 J	1.6 J	3.5	11	1.2 J	6.6	0.57	1	0.61	1.9	10	1.3
Fluorene	0	0	0.22 J	1.8 J	0	0.57 J	0	0	0	0.12 J	2.3	0
Hexachlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0
Indeno(1,2,3-cd)pyrene	0.55 J	0.53 J	0.87	2.4	0.58 J	2	0.2 J	0.78	0.21 J	0.63	2	0.38 J
Naphthalene	0	0	0.17 J	0	0	0.26 J	0	0	0	0.08 J	0.25 J	0
Pentachlorophenol	0	0	0	0	0	0	0	0	0	0	0	0
Phenanthrene	1.2 J	1.3 J	1.9	11	0.79 J	4.6	0.38	0.61	0.34 J	1.1	10	1.1
Phenol	0	0	0	0	0	0	0	0	0	0	0	0
Pyrene	1.4 J	1.4 J	3.3	8.7	1.8 J	5.4	0.49	0.95	0.52	1.6	7.6	1.3
Acetone			0.059									
Benzene			0.0008 J									
n-Butylbenzene			0									
sec-Butylbenzene			0.0079									
tert-Butylbenzene			0.003 J									
1,4-Dichlorobenzene (p-DCB)			0.0019 J									
cis-1,2-Dichloroethene			0									
Ethylbenzene			0									
Methyl ethyl ketone			0.016									
Methylene chloride			0									
n-Propylbenzene			0									
Tetrachloroethene (PCE)			0									
Toluene			0.0015 J									
1,2,4-Trimethylbenzene			0.0029 J									
1,3,5-Trimethylbenzene			0.001 J									
Vinyl chloride			0									
Total Xylene			0									

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SB17-1-6	D-SB18-1-6	D-SB19-1-6	D-SB20-1-6	D-SB21-1-6	D-SB22-1-6	D-SB23-1-6	D-SB24-1-6	D-SB25-1-6	D-SB26-1-6	D-SB27-1-6	D-SB28-1-6
Start Depth	1	1	1	1	1	1	1	1	1	1	1	1
End Depth	6	6	6	6	6	6	6	6	6	6	6	6
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017
Analyte												
Aluminum	15400	8460	9910	14000	6620	7150	7810	4150	3400	8170	10300	9590
Antimony	0	0	46.8	0	0	1.4 J	0	3 J	1.4 J	0	0	0
Arsenic	4.5	6.1	8.3	6.7	5.4	7.9	5.1	7	4.5	9.2	5.5	7.6
Barium	102	106	124	146	57.3	60.8	62.1	38	26.3	133	83.5	131
Beryllium	1.86	0.88	0.58	2.05	0.38	0.64	0.59	0.25 J	0.21 J	0.61	1.44	0.87
Cadmium	0.14 J	0.92	0.82	0.26 J	0.59	7.65	0.65	10.2	6.61	2.04	3.37	0.64
Calcium	100000	91600	54000	104000	52500	22800	17600	6760	9220	63000	47000	54500
Chromium	9.6	13.8	33.4	9.2	24.4	54.3	26.9	68.9	62.1	19.8	31	14.1
Hexavalent Chromium (Cr VI)												
Cobalt	1.8 J	4 J	6.4	2.5 J	5.3 J	2.4 J	2.1 J	2.2 J	2 J	5.9	3.8 J	5.1 J
Copper	17.6	53.9	67.1	21.9	20.3	65.1	29.3	80.4	62.2	49.2	54.5	57.3
Total Cyanide												
Iron	10300	15200	19200	12000	19100	33000	18000	30900	24100	29000	22200	22800
Lead	55.2	178	364	124	46.8	497	83.3	550	314	321	182	220
Magnesium	15000	22200	15700	18200	19600	4330	3530	890	2080	8560	9290	9040
Manganese	1300	499	766	1010	545	1500	596	1320	796	463	888	522
Mercury	0.13	0.278	0.391	0.09	0.152	0.147	0.045	0.281	0.088	0.841	0.011 J	0.21
Nickel	5.6	11.7	18.6	6.8	14.6	19	10.4	21.6	25	14.2	16.7	12.7
Potassium	1570	1290	1530	1230	1300	560	980	300	290	1220	950	1220
Selenium	1.2	0.9 J	1 J	0.8 J	0	1.7	0.77 J	1.7	0.8 J	0.95 J	2	0.87 J
Silver	0	0.1 J	0.1 J	0	0.1 J	1.8	0.1 J	1.9	1.2	1 J	0.7 J	0.2 J
Sodium	960	340	180	560	250	250	310	110	130	210	380	270
Thallium	1.3	1.6	0	0	0	0	0	0	0	0	0	0
Vanadium	13.9	14.6	23.2	10.9	19.4	14.8	13.7	13	10.2	20.8	13.4	18.7
Zinc	74.6	187	192	76	143	1400	150	1800	985	360	550	200
Aroclor 1248	0	0	0	0	0	2.2	0.11	1.5	1.3	1.2	0.051	0
Aroclor 1254	0	0	0.63	0	0	2.8	0.11	2.4	1.3	0.94	0.11	0
Aroclor 1260	0.031 J	0.37	0.85	0.031 J	0	0.63	0.059	0.47	0.25	0.55	0.03 P	0.55
Aldrin	0	0	0	0	0	0	0	0.019	0.018	0.018 J	0	0
delta-BHC												
alpha-Chlordane	0.0099 J	0	0	0	0	0	0	0.0072 J	0	0	0	0
4,4'-DDT (p,p'-DDT)	0	0	0	0	0	0.1	0.0069	0.088	0.053	0.048	0	0.033
4,4'-DDE (p,p'-DDE)	0	0	0	0	0	0	0	0	0	0	0	0
4,4'-DDD (p,p'-DDD)	0	0	0	0	0	0	0	0	0	0	0	0
Dieldrin	0	0	0.23P	0	0	0	0	0	0	0	0	0.011 P
beta-Endosulfan (II)	0	0	0	0	0	0	0	0	0.03	0.031	0	0
Endrin	0	0	0	0	0	0.075	0	0.057	0.035	0.042	0	0
Lindane	0	0	0	0	0	0	0	0.0067 J	0	0	0	0
Acenaphthene	0.84	2.8	0	1.9	0	0	0	0	0	1 J	0	0
Acenaphthylene	0	0.57 J	0	0.94	0	0	0	0	0	0	0	0
Anthracene	2.6	6.1	0.45 J	8.3	0.37 J	0	0	0.27 J	0.25 J	2.9	0	0
Benzo(a)anthracene	2.9	9	1.2	9.9	0.84	0.24 J	0.23 J	0.41 J	0.28 J	4.8	0	1 J

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB17-1-6	D-SB18-1-6	D-SB19-1-6	D-SB20-1-6	D-SB21-1-6	D-SB22-1-6	D-SB23-1-6	D-SB24-1-6	D-SB25-1-6	D-SB26-1-6	D-SB27-1-6	D-SB28-1-6
Start Depth	1	1	1	1	1	1	1	1	1	1	1	1
End Depth	6	6	6	6	6	6	6	6	6	6	6	6
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017
Benzo(h)fluoranthene	2.6	8	1.3	9.4	0.98	0.33 J	0.35 J	0.46 J	0.25 J	4.6	0	1.1 J
Benzo(k)fluoranthene	0.9	3.7	0.63 J	4	0.38 J	0	0	0	0	1.8	0	0.43 J
Benzo(g,h,i)perylene	1.1	3.8	0.66 J	4.4	0.56 J	0	0	0.23 J	0	2.3	0	0.66 J
Benzo(a)pyrene	2.1	6.8	0.98	7.5	0.77 J	0.23 J	0.26 J	0.3 J	0	3.7	0	0.85 J
Chrysene	2.5	7.9	1.1	8.5	0.78 J	0.31 J	0.29 J	0.74 J	0.47 J	4.1	0	1 J
Dibenz(a,h)anthracene	0	1.1	0	1.4	0	0	0	0	0	0.65 J	0	0
Dibenzofuran	1	2.7	0	2.5	0	0	0	0	0	0.83 J	0	0
Fluoranthene	6.6	17	2.3	27	1.4	0.41 J	0.32 J	0.69 J	0.68 J	11	0.52 J	1.8
Fluorene	1.4	3.8	0	4.9	0	0	0	0	0	1.4	0	0
Hexachlorobenzene	0	0	0.48 J	0	0	0	0	0	0	0	0	0
Indeno(1,2,3-cd)pyrene	1	3.4	0.58 J	4.4	0.47 J	0	0	0	0	2	0	0.53 J
Naphthalene	1.1	5.5	1.7	1.6	0.3 J	0	0	0.34 J	0	3.9	0	0
Pentachlorophenol	0	0	0	0	0	0	0	0	0	0	0	0
Phenanthrene	7.3	22	1.8	26	1.2	0.44 J	0.29 J	0.87	0.79	9.6	0.47 J	1.5
Phenol	0	0	0	0	0	0	0	0.29 J	0.41 J	0	0	0
Pyrene	5.2	15	2.1	19	1.3	0.42 J	0.33 J	0.66 J	0.65 J	8.6	0.51 J	1.8
Acetone												
Benzene												
n-Butylbenzene												
sec-Butylbenzene												
tert-Butylbenzene												
1,4-Dichlorobenzene (p-DCB)												
cis-1,2-Dichloroethene												
Ethylbenzene												
Methyl ethyl ketone												
Methylene chloride												
n-Propylbenzene												
Tetrachloroethene (PCE)												
Toluene												
1,2,4-Trimethylbenzene												
1,3,5-Trimethylbenzene												
Vinyl chloride												
Total Xylene												

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SB29-1-6	D-SB38-1-6	D-SB39-1-6	D-SB40-1-6	D-SB41-1-6	D-SB42-1-6	D-SB43-1-6	D-SB32-2-3	D-SB34-3-4	D-SB31-3.5-4.5	D-SB32-4-5	D-SB33-4.5-5.5
Start Depth	1	1	1	1	1	1	1	2	3	3.5	4	4.5
End Depth	6	6	6	6	6	6	6	3	4	4.5	5	5.5
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/24/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017
Analyte												
Aluminum	4780	10500	8420	9150	4620	7650	4090					
Antimony	0	0	0	0	0	0	2.5 J					
Arsenic	3.2	6.7	5.8	7.1	3	4.3	9.1					
Barium	34.9	94.4	63	88.4	128	72.5	61.4					
Beryllium	0.23 J	0.97	0.56	0.59	0.5	0.49	0.29 J					
Cadmium	0.3 J	0.5 J	0.31 J	1.13	2.02	0.32 J	11.3					
Calcium	55800	108000	101000	12900	157000	72500	18400					
Chromium	7.6	14.6	11.6	20.1	6.2	10.9	176					
Hexavalent Chromium (Cr VI)												
Cobalt	3.8 J	4.1 J	3.7 J	8.4	1.8 J	4.3 J	3.4 J					
Copper	17.6	37.2	28.4	38.6	15.3	25	109					
Total Cyanide												
Iron	10200	15200	12900	24300	6950	12900	38100					
Lead	57.3	60.5	122	62.5	61.1	83	543					
Magnesium	20500	18300	15200	5610	11300	17100	2440					
Manganese	373	594	465	353	252	383	1780					
Mercury	0.187	0.214	0	0.115	0.17	0.239	0.246					
Nickel	9.3	11.9	10.5	25.2	6	10.9	48					
Potassium	910	1460	1000	970	780	1450	410					
Selenium	0	0.9 J	0	0.7 J	0.5 J	0.6 J	2.1					
Silver	0	0.1 J	0	0.2 J	0	0.1 J	1.6					
Sodium	180	530	230	150	250	250	150					
Thallium	0	2.5	2.7	0	4.4	0.7 J	0					
Vanadium	13.5	17.8	15.4	18.6	13.2	23.5	17.6					
Zinc	75.6	105	67.1	183	93.8	89.5	1960					
Aroclor 1248	0	0	0	0.068	0	0	0.93					
Aroclor 1254	0	0	0	0	0	0	1.6					
Aroclor 1260	0	0.029 J	0.028 J	0.08	1.1	0	0.33					
Aldrin	0	0	0	0	0	0	0.021					
delta-BHC												
alpha-Chlordane	0	0	0	0	0	0	0					
4,4'-DDT (p,p'-DDT)	0.0096 J	0	0	0.0065 J	0.052	0.0063 J	0.067					
4,4'-DDE (p,p'-DDE)	0	0	0	0	0	0	0					
4,4-DDD (p,p-DDD)	0	0	0	0	0	0	0					
Dieldrin	0	0	0	0	0	0	0					
beta-Endosulfan (II)	0	0	0	0	0	0	0.036					
Endrin	0	0	0	0	0	0	0.046					
Lindane	0	0	0	0	0.014	0	0					
Acenaphthene	0.51 J	0	0	0	2.3	0	0					
Acenaphthylene	0	0	0	0	0.59 J	0	0					
Anthracene	1.6	0	0.33 J	0	7.4	0	0.29 J					
Benzo(a)anthracene	4.6	0.26 J	0.66 J	0	14	0.46 J	0.66 J					

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB29-1-6	D-SB38-1-6	D-SB39-1-6	D-SB40-1-6	D-SB41-1-6	D-SB42-1-6	D-SB43-1-6	D-SB32-2-3	D-SB34-3-4	D-SB31-3.5-4.5	D-SB32-4-5	D-SB33-4.5-5.5
Start Depth	1	1	1	1	1	1	1	2	3	3.5	4	4.5
End Depth	6	6	6	6	6	6	6	3	4	4.5	5	5.5
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/24/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017
Benzo(h)fluoranthene	4.2	0.34 J	0.63 J	0.24 J	14	0.49 J	0.74 J					
Benzo(k)fluoranthene	1.9	0	0.26 J	0	6.5	0	0.31 J					
Benzo(g,h,i)perylene	1.8	0	0.4 J	0	6.1	0	0.37 J					
Benzo(a)pyrene	3.6	0.24 J	0.51 J	0.32 J	11	0.4 J	0.56 J					
Chrysene	3.7	0.32 J	0.61 J	0	12	0.45 J	0.68 J					
Dibenz(a,h)anthracene	0.54 J	0	0	0	1.9	0	0					
Dibenzofuran	0.31 J	0	0	0	1.1	0	0					
Fluoranthene	8.3	0.42 J	1.3	0	28	0.83 J	1.3					
Fluorene	0.5 J	0	0	0	2.4	0	0					
Hexachlorobenzene	0	0	0	0	0	0	0					
Indeno(1,2,3-cd)pyrene	1.7	0	0.34 J	0	5.8	0	0.29 J					
Naphthalene	0.33 J	0	0	0	0.66 J	0	0.26 J					
Pentachlorophenol	0	0	0	0	0	0	0					
Phenanthrene	5.8	0.32 J	1.2	0	18	0.69 J	0.97					
Phenol	0	0	0	0	0	0	0					
Pyrene	8.4	0.44 J	1.1	0	24	0.72 J	1.1					
Acetone								0.091	0.17	0.056	0.69	0.085
Benzene								0.0007 J	0.001 J	0	0	0
n-Butylbenzene								0.015	0.0057 J	0	0	0.0013 J
sec-Butylbenzene								0.035	0.0037 J	0.0047 J	0.038	0.0016 J
tert-Butylbenzene								0.0059 J	0.0008 J	0.0074	0.0096 J	0.0046 J
1,4-Dichlorobenzene (p-DCB)								0	0	0	0	0
cis-1,2-Dichloroethene								0	0	0.0036 J	0	0
Ethylbenzene								0.0005 J	0.0005 J	0	0	0
Methyl ethyl ketone								0.018	0.034	0.0089	0.2	0.017
Methylene chloride								0	0	0.0017 J	0.0028 J	0
n-Propylbenzene								0.012	0.0011 J	0	0	0
Tetrachloroethene (PCE)								0.0074	0.0019 J	0.044	0.02 J	0.0065
Toluene								0	0	0	0	0
1,2,4-Trimethylbenzene								0.0052 J	0.014	0.0037 J	0.01 J	0.0045 J
1,3,5-Trimethylbenzene								0.0011 J	0.0061	0.0019 J	0	0.001 J
Vinyl chloride								0	0.0035 J	0	0	0
Total Xylene								0.0008 J	0.0038 J	0.0008 J	0	0

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SB13-5-6	D-SB16-0-1	D-SS1-0-2	D-SS2-0-2	D-SS3-0-2	D-SS4-0-2	D-SS5-0-2	D-SS10-0-2	D-SS6-0-2	D-SS7-0-2	D-SS8-0-2	D-SS9-0-2
Start Depth	5	0	0	0	0	0	0	0	0	0	0	0
End Depth	6	1	2	2	2	2	2	2	2	2	2	2
Depth Unit	ft	ft	in	in	in	in	in	in	in	in	in	in
Sample Date	8/22/2017	8/23/2016	8/16/2017	8/16/2017	8/16/2017	8/16/2017	8/16/2017	8/17/2017	8/17/2017	8/17/2017	8/17/2017	8/17/2017
Analyte												
Aluminum		9730	11800	20800	12900	9800	11700	8900	5680	6120	5890	6140
Antimony		0	0	0	3.3 J	0	0	1.6 J	0	0	2.2 J	1.5 J
Arsenic	13.3	6.9	10.1	19	9.1	5.8	6.7	7.8	3.5	6.5	4.7	4.7
Barium	139	108	427	356	146	122	148	55	49.6	81.1	39.6	39.6
Beryllium	1.07	1.17	3.07	1.15	0.62	0.99	0.54	0.81	0.35	0.37	0.26 J	0.26 J
Cadmium	2.97	0.51 J	0.66	3.46	2.77	1.56	1.16	0.47 J	0.57 J	8.1	5.81	5.81
Calcium	39000	50300	94800	23200	31500	57500	36200	100000	184000	15300	5520	5520
Chromium	30.4	36	18	58.6	32.9	20.4	21.6	14.4	10.9	55.7	40.1	40.1
Hexavalent Chromium (Cr VI)	0.06 J	0	0.05 J	0.19 J	0	0	0	0	0.11 J	0.1 J	0	0
Cobalt	4.9 J	4.9 J	2.4 J	5.5 J	6.4	5.8	6	2.6 J	3.7 J	4 J	1.9 J	1.9 J
Copper	158	26.5	42.3	348	51.2	106	49.5	10.4	18.2	66.1	44.3	44.3
Total Cyanide	2.72	1.09	8.83	0.94	0.58	3.3	0.41	1.11	0.08 J	1.1	0.83	0.83
Iron	59200	19700	26900	25300	22700	23100	20900	12500	13000	26300	28400	28400
Lead	267	40.3	115	451	432	189	302	47.1	56.6	490	299	299
Magnesium	7150	8850	9880	5090	9950	13300	11000	7170	11100	2370	880	880
Manganese	1590	928	1520	553	767	660	505	685	934	1030	1010	1010
Mercury	0.578	0.113	0.147	1.01	0.651	0.295	0.655	0.039	0.181	0.347	0.123	0.123
Nickel	18.2	13.6	8.6	35.9	19.2	16.7	16.1	5.6	9.9	21.2	16.1	16.1
Potassium	1080	1920	2620	1300	1790	2260	1780	740	1520	1090	660	660
Selenium	2	1.7	2.2	2.3	1.2	1.8	0.8 J	1.1	0	2.2	1.3	1.3
Silver	0.4 J	0	0.1 J	2.1	0.6 J	0.3 J	0.2 J	0	0.09 J	1.5	1.1	1.1
Sodium	370	280	540	430	210	210	200	280	200	180	130	130
Thallium	0	0	0	0	0	0	0	2	4	0	0	0
Vanadium	23	18.6	15.8	21.6	24.4	20.9	21.4	12.8	13.7	14.6	13	13
Zinc	514	117	149	730	589	406	328	81.4	117	1300	897	897
Aroclor 1248	0	0	0	0	0.052	###	0	0	0	0.14	0.1 J	0.1 J
Aroclor 1254	0	0	0	0	0	0.11	0	0	0	0.55	0.47	0.47
Aroclor 1260	0.023 J	0.034 J	0.13	0.12	0.21	0.083	0.07	0	0.023 J	0.13 P	0.12	0.12
Aldrin	0	0	0	0	0	0	0	0	0	0	0	0
delta-BHC	0	0	0	0	0	0	0	0	0	0	0	0
alpha-Chlordane	0	0	0	0	0	0	0	0	0	0	0	0
4,4'-DDT (p,p'-DDT)	0	0	0	0.011	0.039	0.015	0.01	0	0.024	0.051	0.033	0.033
4,4'-DDE (p,p'-DDE)	0	0	0	0	0.0083 JP	0	0.0084 J	0	0	0	0	0
4,4'-DDD (p,p'-DDD)	0	0	0	0	0	0	0	0	0	0	0	0
Dieldrin	0	0	0	0	0.0075 JP	0	0	0	0.012	0	0	0
beta-Endosulfan (II)												
Endrin	0	0	0	0	0.018	0.01	0.0072 J	0	0.01 P	0.026	0.017	0.017
Lindane	0	0	0	0	0	0	0	0	0	0.0066 J	0	0
Acenaphthene	0	0	0	0	0.19 J	2.1	0	0	0	0.15 J	0	0
Acenaphthylene	0.26 J	0	0.13 J	0	0	0	0.2 J	0	0.21 J	0.09 J	0	0
Anthracene	0.66 J	0.11 J	0.14 J	0.19 J	0.53	6.1	0.38 J	0	0.53	0.7	0	0
Benzo(a)anthracene	2.8	0.36 J	0.52	0.72	1.2	7.7	1.2	0	1.1	1.6	0.14 J	0.14 J



Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB13-5-6	D-SB16-0-1	D-SS1-0-2	D-SS2-0-2	D-SS3-0-2	D-SS4-0-2	D-SS5-0-2	D-SS10-0-2	D-SS6-0-2	D-SS7-0-2	D-SS8-0-2	D-SS9-0-2
Start Depth	5	0	0	0	0	0	0	0	0	0	0	0
End Depth	6	1	2	2	2	2	2	2	2	2	2	2
Depth Unit	ft	ft	in	in	in	in	in	in	in	in	in	in
Sample Date	8/22/2017	8/23/2016	8/16/2017	8/16/2017	8/16/2017	8/16/2017	8/16/2017	8/17/2017	8/17/2017	8/17/2017	8/17/2017	8/17/2017
Benzo(h)fluoranthene		4.9	0.45	0.76	0.92	1.4	6.7	1.6	0	1.3	1.6	0.2 J
Benzo(k)fluoranthene		1.4	0.14 J	0.25 J	0.31 J	0.45	2.4	0.58	0	0.44	0.54	0
Benzo(g,h,i)perylene		2.5	0.24 J	0.38 J	0.43	0.59	2.9	0.65	0	0.5	0.73	0.095 J
Benzo(a)pyrene		2.9	0.35 J	0.55	0.72	1.1	6.2	1.3	0	1.1	1.3	0.11 J
Chrysene		3	0.36 J	0.55	0.71	1.2	7	1.3	0	1	1.5	0.17 J
Dibenz(a,h)anthracene		0.69 J	0	0.1 J	0.12 J	0.16 J	0.88 J	0.19 J	0	0.15 J	0.19 J	0
Dibenzofuran		0.33 J	0	0	0	0.16 J	2.3	0	0	0	0.16 J	0
Fluoranthene		4.2	0.72	1	1.4	2.7	20	2.7	0	2.8	4	0.28 J
Fluorene		0.24 J	0	0	0	0.21 J	2.9	0.13 J	0	0.18 J	0.26 J	0
Hexachlorobenzene		0	0	0	0	0	0	0	0	0	0	0
Indeno(1,2,3-cd)pyrene		2.1	0.28 J	0.45	0.52	0.73	3.6	0.79	0	0.63	0.89	0.086 J
Naphthalene		0.58 J	0	0	0.094 J	0.15 J	2.7	0	0	0	0	0
Pentachlorophenol		0	0	0	0	0	0	0	0	0	0	0
Phenanthrene		2.8	0.35 J	0.48	0.74	2.1	24	1.5	0	1.7	3.3	0.25 J
Phenol		0	0	0	0	0	0	0	0	0	0	0
Pyrene		3.8	0.58	0.81	1.1	2.2	15	2.4	0	2.2	3.2	0.25 J
Acetone	0											
Benzene	0											
n-Butylbenzene	0											
sec-Butylbenzene	0											
tert-Butylbenzene	0											
1,4-Dichlorobenzene (p-DCB)	0											
cis-1,2-Dichloroethene	0											
Ethylbenzene	0											
Methyl ethyl ketone	0											
Methylene chloride	0											
n-Propylbenzene	0											
Tetrachloroethene (PCE)	0											
Toluene	0											
1,2,4-Trimethylbenzene	0											
1,3,5-Trimethylbenzene	0											
Vinyl chloride	0											
Total Xylene	0											

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB5-0-1	D-SB6-0-1	D-SB7-0-1	D-SB10-0-1	D-SB11-0-1	D-SB12-0-1	D-SB13-0-1	D-SB14-0-1	D-SB15-0-1	D-SB8-0-1	D-SB9-0-1	D-SB17-0-1
Start Depth	0	0	0	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/21/2017	8/21/2017	8/21/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/23/2017
Analyte												
Aluminum	23000	10300	10700	6190	13600	9780	13500	9940	7320	5790	6980	13100
Antimony	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	3.6	14.1	17.3	3.2	3.8	5.4	4.6	7.6	3.8	4.8	4.1	3.8
Barium	227	175	171	51.7	132	73.1	117	258	49.2	120	58	115
Beryllium	4.37	1.24	1.44	0.47	1.63	0.48	1.12	0.74	0.32	0.35	0.49	2.12
Cadmium	0.8	1.07	1.3	0.15 J	0.63	0.35 J	0.38 J	0.97	0.18 J	0.31 J	0.26 J	0.19 J
Calcium	158000	131000	111000	124000	113000	37900	69800	42600	44600	42400	96400	107000
Chromium	13.5	164	33.9	6.5	8	13.9	12.1	21.9	9.7	9.2	9.9	9.5
Hexavalent Chromium (Cr VI)	0	0.91	0	0	0	0	0	0	0	0	0	0
Cobalt	1.3 J	3.6 J	5.1 J	2.5 J	2.4 J	8.2	4.6 J	5.3 J	5.1 J	4.4 J	3.1 J	1.7 J
Copper	23.6	26	77.3	14	18	18.9	28.6	35.9	11.5	22.3	29.4	17
Total Cyanide	5.18	0.16	0.44	0.22	0.82	0.09 J	0.27	1.64	0	0.21	0.1	0.93
Iron	16500	20000	18900	7980	8640	19100	14100	18900	14000	13900	10500	10300
Lead	37.1	127	198	18.9	90.5	17.3	193	692	9.7	161	92.8	64.6
Magnesium	23400	14600	9460	17500	29100	13300	14200	9960	14600	8740	18300	13800
Manganese	1960	3070	989	488	1890	467	919	593	329	306	513	1730
Mercury	0	0.096	0.28	0.115	0.149	0.033 J	0.165	0	0.016 J	0.3	0.136	0
Nickel	6.3	11.8	16.3	7.6	6.5	18.6	10.6	14.5	10.4	12.8	8.5	6.1
Potassium	1450	1900	3080	1050	1590	1650	1650	1250	1610	800	1220	1320
Selenium	1.8	2.34	1.53	0	1.4	0.9 J	1 J	0.9 J	0	0.4 J	0.6 J	1.6
Silver	0	0.3 J	0.5 J	0	0	0	0	0.09 J	0	0	0	0
Sodium	1420	750	360	270	450	160	350	210	150	150	250	490
Thallium	2.36	3.56	2.5	3.2	1.6	0	0	0	0	0	1.9	1.24
Vanadium	8.8	69.7	26.1	11.3	11.6	22.5	16.7	19.4	20.7	13.4	14.8	8.5
Zinc	116	172	263	41.2	274	68.4	112	320	50.5	77	74.1	87.4
Aroclor 1248	0	0	0	0	0	0	0	0	0	0	0	0
Aroclor 1254	0	0	0	0	0	0	0	0	0	0	0	0
Aroclor 1260	0	0	0.044	0	0	0	0	0.069	0	0	0	0.064
Aldrin	0	0	0	0	0	0	0	0	0	0	0	0
delta-BHC	0	0	0	0	0	0	0	0	0	0	0	0
alpha-Chlordane	0	0	0	0	0	0	0	0	0	0	0	0
4,4'-DDT (p,p'-DDT)	0	0	0	0	0	0	0	0.18	0	0.0053 J	0.0065 J	0
4,4'-DDE (p,p'-DDE)	0	0	0	0	0	0	0	0	0	0	0	0
4,4'-DDD (p,p'-DDD)	0	0	0	0	0	0	0	0.054	0	0	0	0
Dieldrin	0	0	0	0	0	0	0	0	0	0	0	0
beta-Endosulfan (II)												
Endrin	0	0	0	0	0	0	0	0.044	0	0	0	0
Lindane	0	0	0	0	0	0	0	0	0	0	0	0
Acenaphthene	0	0	0	0	0	0	0	0	0	0	0	0
Acenaphthylene	0	0	0.12 J	0	0	0	0	0	0	0	0	0
Anthracene	0	0	0.22 J	0	0	0	0	0.12 J	0.48 J	0	0.3 J	0.28 J
Benzo(a)anthracene	0	0.55	0.69	0	0.14 J	0	0.39 J	1.6	0	0.6 J	0.83 J	0.74

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB5-0-1	D-SB6-0-1	D-SB7-0-1	D-SB10-0-1	D-SB11-0-1	D-SB12-0-1	D-SB13-0-1	D-SB14-0-1	D-SB15-0-1	D-SB8-0-1	D-SB9-0-1	D-SB17-0-1
Start Depth	0	0	0	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/21/2017	8/21/2017	8/21/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/22/2017	8/23/2017
Benzo(h)fluoranthene	0	0.92	0.87	0	0.16 J	0	0.52	1.8	0	0.65 J	1.1 J	0.82
Benzo(k)fluoranthene	0	0.31 J	0.31 J	0	0	0	0.17 J	0.6 J	0	0.25 J	0	0.31 J
Benzo(g,h,i)perylene	0	0.54	0.35 J	0	0.09 J	0	0.24 J	0.93 J	0	0.42 J	0.56 J	0.51 J
Benzo(a)pyrene	0	0.79	0.7	0	0.14 J	0	0.42	1.6	0	0.59 J	0.9 J	0.62 J
Chrysene	0	0.66	0.65	0	0.14 J	0	0.4	1.7	0	0.55 J	0.79 J	0.66 J
Dibenz(a,h)anthracene	0	0.13 J	0.094 J	0	0	0	0	0.27 J	0	0	0	0
Dibenzofuran	0	0	0	0	0	0	0	0	0	0	0	0
Fluoranthene	0	0.72	1.4	0	0.24 J	0	0.76	2.9	0.087 J	1.2	1.4 J	1.1
Fluorene	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0
Indeno(1,2,3-cd)pyrene	0	0.61	0.44	0	0.079 J	0	0.28 J	0.94 J	0	0.44 J	0.57 J	0.4 J
Naphthalene	0	0	0	0	0	0	0	0	0	0	0	0
Pentachlorophenol	0	0	0	0	0	0	0	0	0	0	0	0
Phenanthrene	0	0.29 J	0.65	0	0.16 J	0	0.46	2	0	0.94 J	0.7 J	1.1
Phenol	0	0	0	0	0	0	0	0	0	0	0	0
Pyrene	0	0.69	1.2	0	0.22 J	0	0.68	2.9	0	1 J	1.3 J	1.1
Acetone												
Benzene												
n-Butylbenzene												
sec-Butylbenzene												
tert-Butylbenzene												
1,4-Dichlorobenzene (p-DCB)												
cis-1,2-Dichloroethene												
Ethylbenzene												
Methyl ethyl ketone												
Methylene chloride												
n-Propylbenzene												
Tetrachloroethene (PCE)												
Toluene												
1,2,4-Trimethylbenzene												
1,3,5-Trimethylbenzene												
Vinyl chloride												
Total Xylene												

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SB18-0-1	D-SB19-0-1	D-SB20-0-1	D-SB21-0-1	D-SB22-0-1	D-SB23-0-1	D-SB24-0-1	D-SB25-0-1	D-SB26-0-1	D-SB27-0-1	D-SB28-0-1	D-SB29-0-1
Start Depth	0	0	0	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017
Analyte												
Aluminum	6250	9960	7820	7640	4510	6770	4930	3880	20700	8060	9590	6650
Antimony	0	0	1.1 J	0	0	2.4 J	1.6 J	3.1 J	1.9 J	0	0	0
Arsenic	3.8	7.3	5.3	5.9	11.4	10.8	8.9	6.4	6.7	4.9	9	3.2
Barium	55.9	113	123	83.3	52.9	89.8	50.8	52.7	216	82.5	93.1	61.7
Beryllium	0.34	0.99	0.51	0.42	0.29 J	0.78	0.26 J	0.29 J	3.25	0.7	0.72	0.33
Cadmium	0.71	0.53 J	0.69	0.69	7.3	7.47	11.3	13.3	2.74	0.5 J	0.45 J	0.37 J
Calcium	101000	51500	58200	48700	9780	22300	6710	9930	120000	33100	76200	88100
Chromium	11.1	12.2	12.9	19.7	165	56.4	81.4	60.4	20	12.1	16.1	10.4
Hexavalent Chromium (Cr VI)	0	0	0.2 J	0	0.24 J	0.23 J	0.31 J	0	0.21 J	0.15 J	0.06 J	0
Cobalt	3.8 J	5.2 J	5 J	4.4 J	4.9 J	3.5 J	3.1 J	2.4 J	2.8 J	5 J	5.2 J	3.8 J
Copper	23.3	72.3	34.7	20.1	149	91.8	92.4	99.5	88	30.5	31.7	37.6
Total Cyanide	0.04 J	0.22	0.049 J	0.08 J	1.24	1.55	0.578	0.458	1.14	0.69	0.13	0
Iron	11500	15600	15300	16900	94900	37900	49600	28300	16700	15000	31300	11500
Lead	70.4	151	207	127	398	559	543	767	249	79.7	76.8	108
Magnesium	10800	11700	13400	17200	3360	3880	800	2700	27000	6450	17800	26600
Manganese	274	712	454	434	1410	1620	1560	1640	1790	306	552	286
Mercury	0.089	0.447	0.308	0.18	0.297	0.35	0.273	0.152	0	3.1	0.089	0.199
Nickel	10.6	13.1	13.4	12.2	51.1	30	28.2	24.6	11.6	14.4	17.5	9.8
Potassium	1130	1300	1390	1200	590	750	300	380	1680	1350	1780	1390
Selenium	0	1 J	0	0	2.4	1.8	2.29	1.7	2.38	0.56 J	1.21	0
Silver	0	0.1 J	0.1 J	0.2 J	1.5	1.7	2	2.9	1.4	0.08 J	0	0
Sodium	170	250	210	500	140	230	160	120	740	220	620	290
Thallium	2.2	0	0	0	0	0	0	0	0.7 J	0	0.9 J	1.6
Vanadium	14.3	17.5	17.9	21.2	19.6	16.9	15.6	11.1	14	13.7	22	16.8
Zinc	728	161	124	173	1200	1330	1960	2310	587	183	110	107
Aroclor 1248	0	0	0	0	0.89	0.28	0.3	0.35	1.1	0	0	0
Aroclor 1254	0	0	0	0	2	0.93 P	1	1	0.82	0	0	0
Aroclor 1260	0	0.079	0.13	0	1.7	0.37	0.24	0.38	0.23	0.12	0.023 J	0
Aldrin	0	0	0	0	0	0	0.0058 J	0.0069 J	0.016	0	0	0
delta-BHC	0	0	0	0	0	0	0	0	0	0	0	0
alpha-Chlordane	0	0	0	0	0	0	0	0	0	0	0	0
4,4'-DDT (p,p'-DDT)	0	0	0	0	0.11	0.048	0.05	0.051	0.037	0.012	0	0.027
4,4'-DDE (p,p'-DDE)	0	0	0	0	0	0.019	0	0	0	0	0	0
4,4'-DDD (p,p'-DDD)	0	0	0	0	0	0	0	0	0	0	0	0
Dieldrin	0	0	0	0	0	0	0	0	0	0	0	0
beta-Endosulfan (II)												
Endrin	0	0.0079 J	0	0	0.049 P	0.026	0.029	0.029	0.026	0	0	0
Lindane	0	0	0	0	0	0	0	0	0	0	0	0
Acenaphthene	0	0.9	0	2.4	0	0	0	0	0	0	0	0
Acenaphthylene	0	2.9	0	0.35 J	0	0	0	0	0	0	0	0
Anthracene	0	7.6	0	7.7	0	0	0.51 J	0	0.72 J	0	0.35 J	0.39 J
Benzo(a)anthracene	0.52 J	11	0.91 J	12	0.31 J	0.49 J	1.8	0.41 J	1.8	0.28 J	0.84	1.1

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SB18-0-1	D-SB19-0-1	D-SB20-0-1	D-SB21-0-1	D-SB22-0-1	D-SB23-0-1	D-SB24-0-1	D-SB25-0-1	D-SB26-0-1	D-SB27-0-1	D-SB28-0-1	D-SB29-0-1
Start Depth	0	0	0	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/23/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017	8/24/2017
Benzo(b)fluoranthene	0.61 J	11	1 J	11	0.4 J	0.7 J	2.9	0.47 J	2.1	0.28 J	0.91	1.1
Benzo(k)fluoranthene	0	4.5	0.43 J	5.1	0	0	0.72 J	0	0.56 J	0	0.28 J	0.47 J
Benzo(g,h,i)perylene	0.34 J	7.5	0.62 J	4.9	0	0.44 J	1.5	0.27 J	0.99	0	0.49 J	0.64 J
Benzo(a)pyrene	0.45 J	9.2	0.83 J	8.7	0	0.48 J	1.8	0.32 J	1.5	0	0.7 J	0.91
Chrysene	0.48 J	8.9	0.83 J	9.9	0.57 J	0.59 J	1.9	0.4 J	1.8	0.28 J	0.81	0.99
Dibenz(a,h)anthracene	0	1.6	0	1.4	0	0	0.38 J	0	0.27 J	0	0	0
Dibenzofuran	0	4.8	0	1.7	0	0	0	0	0	0	0	0
Fluoranthene	0.9	32	1.5	28	0.6 J	0.6 J	3.6	0.61 J	3.9	0.46 J	1.7	2.2
Fluorene	0	7.8	0	2.7	0	0	0	0	0.36 J	0	0	0
Hexachlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0
Indeno(1,2,3-cd)pyrene	0.31 J	6.3	0.51 J	4.7	0	0.32 J	1.2	0	0.83	0	0.42 J	0.53 J
Naphthalene	0	14	0	1.7	0	0.33 J	0	0	2	0	0	0
Pentachlorophenol	0	0	0	0	0	0	0	0	0	0	0	0
Phenanthrene	0.61 J	38	1 J	26	0.63 J	0.64 J	1.6	0.5 J	2.5	0.35 J	1.5	1.5
Phenol	0	0	0	0	0	0	0	0	0	0	0	0
Pyrene	0.86	26	1.4	22	0.51 J	0.69 J	3.1	0.57 J	3.2	0.46 J	1.6	2
Acetone												
Benzene												
n-Butylbenzene												
sec-Butylbenzene												
tert-Butylbenzene												
1,4-Dichlorobenzene (p-DCB)												
cis-1,2-Dichloroethene												
Ethylbenzene												
Methyl ethyl ketone												
Methylene chloride												
n-Propylbenzene												
Tetrachloroethene (PCE)												
Toluene												
1,2,4-Trimethylbenzene												
1,3,5-Trimethylbenzene												
Vinyl chloride												
Total Xylene												

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SB38-0-1	D-SB39-0-1	D-SB40-0-1	D-SB41-0-1	D-SB42-0-1	D-SB43-0-1	D-SS1-2-12	D-SS2-2-12	D-SS3-2-12	D-SS4-2-12	D-SS5-2-12	D-SS10-2-12
Start Depth	0	0	0	0	0	0	2	2	2	2	2	2
End Depth	1	1	1	1	1	1	12	12	12	12	12	12
Depth Unit	ft	ft	ft	ft	ft	ft	in	in	in	in	in	in
Sample Date	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/16/2017	8/16/2017	8/16/2017	8/16/2017	8/16/2017	8/17/2017
Analyte												
Aluminum	9590	8500	7500	9890	5410	5260	9750	6170	10700	10300	11300	9550
Antimony	0	0	0	0	0	0	0	0	4.1 J	0	0	1.7 J
Arsenic	8.3	7.1	12.6	6.7	4.9	6.8	4.9	19.5	17	11.3	5.6	5.7
Barium	90.1	83.7	76.5	77.3	56	74	89.4	152	357	164	121	154
Beryllium	0.88	0.84	0.73	0.71	0.35	0.35	0.82	0.88	0.91	0.61	0.88	0.62
Cadmium	0.31 J	0.36 J	0.66	0.56	0.48 J	3.29	0.36 J	0.61	3.38	1.68	0.96	0.96
Calcium	96500	101000	70800	42000	70100	39800	57400	5890	26800	26500	70100	44800
Chromium	11.7	10	17.3	12.8	9.5	29.6	93.8	17.2	85.3	39.9	17.1	17.3
Hexavalent Chromium (Cr VI)	0	0	0	0	0	0.08 J						
Cobalt	5.1 J	3.8 J	6.3	7.4	3.4 J	3.5 J	3.8 J	5.6	5.9	7.6	5.7	5.5 J
Copper	21.9	24.3	43.4	50.4	24.6	1420	18.2	102	377	54.8	69.7	44.9
Total Cyanide	0.19	0.59	0.29	0.15	0.09 J	0.25						
Iron	15400	14200	21800	23900	10600	19200	16600	13900	22600	24300	20500	17600
Lead	38.1	70.7	108	45.8	107	310	31.6	760	515	525	157	293
Magnesium	15100	17100	6470	12400	11800	12400	7010	900	6570	9430	19000	14300
Manganese	784	787	426	402	266	648	1850	141	454	761	674	497
Mercury	0.024 J	0.103	0.626	0.19	0.225	0.425	0.075	0.107	0.839	0.791	0.293	0.801
Nickel	12.8	10.1	16.6	18.9	9.5	5.5	9.4	15.1	34.8	20.3	14	14.6
Potassium	1420	1250	990	1270	1150	900	1500	720	1190	1590	2410	1720
Selenium	0.9 J	0.9 J	1.5	0.6 J	0.5 J	1 J	1.9	2.3	1.5	1.1 J	0.9 J	0.6 J
Silver	0	0	0.1 J	0	0	0.9 J	0	10.7	2.9	0.4 J	0.2 J	0.2 J
Sodium	290	300	210	190	240	200	300	200	330	170	230	200
Thallium	2.2	2.1	1.3	0	1.8	0	0	0	0	0	0.8 J	0
Vanadium	16	12.8	17.4	17.6	15.1	16.5	19.1	28.6	22.6	28.2	20.9	19.9
Zinc	67.6	63.3	140	128	117	1090	78.3	140	764	432	260	271
Aroclor 1248	0	0	0	0	0	0.077	0	0	0	0	0	0
Aroclor 1254	0	0	0	0	0	0.22	0	0	0.44	0	0.05	0
Aroclor 1260	0	0.028 J	0.043	0.14	0.17	0.17	0.027 J	0.095	0.42	0.094	0.042	0.04
Aldrin	0	0	0	0	0	0	0	0	0	0	0	0
delta-BHC	0	0	0	0	0	0	0	0	0	0	0	0
alpha-Chlordane	0	0	0	0	0	0	0	0	0	0	0	0
4,4'-DDT (p,p'-DDT)	0	0	0	0.0086 J	0.049	0.017	0	0.0053 JP	0.06	0.014	0.0082 J	0.0061 J
4,4'-DDE (p,p'-DDE)	0	0	0	0	0	0	0	0	0.0083 J	0	0	0
4,4'-DDD (p,p'-DDD)	0	0	0	0	0	0	0	0	0	0	0	0
Dieldrin	0	0	0	0	0	0	0	0	0.029 P	0	0	0
beta-Endosulfan (II)												
Endrin	0	0	0	0	0.014	0.008 J	0	0.0081 J	0.028	0.0072 J	0.0062 J	0
Lindane	0	0	0	0	0	0.0063 J	0	0	0	0	0	0.016
Acenaphthene	0	0	0	0.69 J	0	0.48 J	0	0	0	0	0	0
Acenaphthylene	0	0	0	0	0	0	0	0	0	0.079 J	0	0.85 J
Anthracene	0	0	0	1.4	0.74 J	1.2	0.078 J	0	0.41 J	0.26 J	0.82 J	1.9
Benzo(a)anthracene	0.7 J	0.51 J	0	2.2	2.4	3	0.26 J	0	1.4 J	0.87	2	4.5

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB38-0-1	D-SB39-0-1	D-SB40-0-1	D-SB41-0-1	D-SB42-0-1	D-SB43-0-1	D-SS1-2-12	D-SS2-2-12	D-SS3-2-12	D-SS4-2-12	D-SS5-2-12	D-SS10-2-12
Start Depth	0	0	0	0	0	0	2	2	2	2	2	2
End Depth	1	1	1	1	1	1	12	12	12	12	12	12
Depth Unit	ft	ft	ft	ft	ft	ft	in	in	in	in	in	in
Sample Date	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/29/2017	8/16/2017	8/16/2017	8/16/2017	8/16/2017	8/16/2017	8/17/2017
Benzo(h)fluoranthene	0.74 J	0.59 J	0.53 J	2	2.7	3.7	0.29 J	0	1.6 J	1.1	2.3	4.8
Benzo(k)fluoranthene	0	0	0	0.79	0.91 J	0.98	0.12 J	0	0.55 J	0.41	0.89 J	1.7
Benzo(g,h,i)perylene	0.39 J	0.34 J	0.59 J	1	1 J	1.3	0.15 J	0	0.86 J	0.46	0.95 J	3
Benzo(a)pyrene	0.55 J	0.46 J	0	1.8	2	2.7	0.23 J	0	1.3 J	0.86	1.9 J	4.1
Chrysene	0.6 J	0.54 J	0.45 J	1.9	2.2	2.4	0.26 J	0	1.4 J	0.91	2	4.1
Dibenz(a,h)anthracene	0	0	0	0.27 J	0	0.38 J	0	0	0	0.13 J	0	0.6 J
Dibenzofuran	0	0	0	0.46 J	0	0.33 J	0	0	0	0	0	0.59 J
Fluoranthene	1.1	0.8	0.5 J	5.1	4.2	6.4	0.54	0	2.8	1.9	5.2	12
Fluorene	0	0	0	0.67 J	0	0.61 J	0	0	0	0	0	1.1 J
Hexachlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0
Indeno(1,2,3-cd)pyrene	0.34 J	0.28 J	0	0.89	0.89 J	1.3	0.18 J	0	0.93 J	0.57	1.2 J	3.3
Naphthalene	0	0	0.45 J	0.28 J	1.2 J	0.56 J	0	0	0	0	0	0
Pentachlorophenol	0	0	0	0	0	0	0	0	0	0	0	0
Phenanthrene	0.72 J	0.49 J	0.52 J	5.6	2.6	5.4	0.26 J	0	1.9	1.1	4.7	10
Phenol	0	0	0	0	0	0	0	0	0	0	0	0
Pyrene	1.1 J	0.8	0.54 J	4.4	3.6	4.8	0.43	0	2.3	1.6	4	9.1
Acetone												
Benzene												
n-Butylbenzene												
sec-Butylbenzene												
tert-Butylbenzene												
1,4-Dichlorobenzene (p-DCB)												
cis-1,2-Dichloroethene												
Ethylbenzene												
Methyl ethyl ketone												
Methylene chloride												
n-Propylbenzene												
Tetrachloroethene (PCE)												
Toluene												
1,2,4-Trimethylbenzene												
1,3,5-Trimethylbenzene												
Vinyl chloride												
Total Xylene												

Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SS6-2-12	D-SS7-2-12	D-SS8-2-12	D-SS9-2-12	SB-01 (0-1)	SB-02 (0-1)	SB-03 (0-1)	SB-01 (1-5)	SB-02 (1-5)	SB-03 (1-5)	Chemical of Potential Concern	Maximum Detected	NYSDEC / USEPA Residential Soil Standard
Start Depth	2	2	2	2	0	0	0	1	1	1			
End Depth	12	12	12	12	1	1	1	5	5	5			
Depth Unit	in	in	in	in	ft	ft	ft	ft	ft	ft			
Sample Date	8/17/2017	8/17/2017	8/17/2017	8/17/2017	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019			
Analyte													
Aluminum	4910	9540	5740	3390	14700	15000	5010	2290	6260	7380	X	23000	7,700
Antimony	0	0	2.8 J	1.2 J	8.3 U	2.2 BJ	0.9 BJ	7.4 U	6 BJ	7.4 U	X	189	3.1
Arsenic	5.8	5.4	8.4	5.7	2.7	4.4	5.7	12 U	5.5	3.9	X	19.5	16
Barium	46.7	80.9	74.8	39.3	171	312	57.2	16	180	78.9	X	1530	350
Beryllium	0.55	0.51	0.39	0.23 J	2.92	2.71	0.67	0.16 BJ	0.41	0.69		4.37	14
Cadmium	0.42 J	0.54 J	11.7	7.17	0.63 BJ	1.97	0.6 BJ	0.27 BJ	1.5	0.86 B	X	26.2	2.5
Calcium	54900	54100	8230	4020	128000	143000	27100	43600	65200	37500	(1)	184000	
Chromium	9.8	20.2	70.3	96.5	15.5	9.8	8.9	6.4	12.9	14.2	X	176	36
Hexavalent Chromium (Cr VI)					0.12 J	0.55 U	0.54 U					0.91	22
Cobalt	3.2 J	6.1	2.9 J	3.2 J	2.5 BJ	2.4 BJ	3.2 BJ	2.1 BJ	4.5 J	3.7 BJ	X	8.4	2.3
Copper	8.7	36	89.8	75.6	31.8	18.2	16.8	6.4	59.2	21.7	X	1420	270
Total Cyanide					0.99	0.45	0.55					8.83	27
Iron	12700	18600	37000	38200	12200	11000	13500	8180	16500	11800	(1)	94900	
Lead	52.2	87.9	609	362	35.7	88.9	78.1	9.5	456	160	X	3400	400
Magnesium	6600	15000	1840	750	27700	26700	7000	18800	24400	10400	(1)	29100	
Manganese	501	451	1560	1170	1960	1210	417	269	418	499	X	3070	2,000
Mercury	0.034	0.157	0.256	0.185	0.259	0.053	0.079	0.019 J	0.206	0.076	X	3.1	0.81
Nickel	6.8	18.7	25.6	40	7.8	5.1 J	7.7	3.9 J	10.5	8.6		51.1	140
Potassium	650	1970	890	440	1540	1500	740	520	1320	1110	(1)	3080	
Selenium	0.9 J	1.2	2	2.2	0.8 J	1.3 U	1.3 U	1.2 U	1.1 U	1.2 U		3.6	36
Silver	0	0.1 J	2.2	1.3	1.4 U	1.3 U	1.3 U	1.2 U	0.2 J	1.2 U	X	10.7	36
Sodium	190	200	150	130	670	540	130	110 J	210	220	(1)	1420	
Thallium	0	0	0	0	3.8	4.2	1.3 U	1.4	1.5	1 J	X	4.4	0.078
Vanadium	12.7	22	14.3	11.1	13.6	12.1	10.3	9.4	16.8	18.2	X	69.7	39
Zinc	71	190	1890	1110	116	89.7	97.3	63.4	190	109	X	2310	2,200
Aroclor 1248	0	0	0.29	0.26	0.048 U	0.087 U	0.047 U	0.041 U	0.19 U	0.032 U	X	2.2	1
Aroclor 1254	0	0	0.93	0.75	0.048 U	0.087 U	0.047 U	0.041 U	0.19 U	0.023 J	X	2.8	1
Aroclor 1260	0.39	0.32	0.23	0.2	0.048 U	0.087 U	0.047 U	0.041 U	0.19 U	0.021 J	X	1.7	1
Aldrin	0	0	0.0065 J	0.0062 J	0.012 U	0.045 U	0.012 U				X	0.021	0.019
delta-BHC	0	0	0	0.005 J	0.012 U	0.045 U	0.012 U					0.005	100
alpha-Chlordane	0	0	0	0	0.012 U	0.045 U	0.012 U					.0099	0.91
4,4'-DDT (p,p'-DDT)	0	0.015 P	0.071	0.057	0.012 U	0.045 U	0.012 U				X	54	1.7
4,4'-DDE (p,p'-DDE)	0	0	0	0	0.012 U	0.045 U	0.012 U					0.019	1.8
4,4-DDD (p,p-DDD)	0	0	0	0	0.012 U	0.045 U	0.012 U				X	18	2.6
Dieldrin	0	0	0	0	0.012 U	0.045 U	0.012 U					0.029	0.039
beta-Endosulfan (II)					0.012 U	0.045 U	0.012 U					0.036	4.8
Endrin	0	0.014	0.043	0.029	0.012 U	0.045 U	0.012 U				X	10	2.2
Lindane	0	0	0.01	0								0.016	0.57
Acenaphthene	0	0.48	0.11 J	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.43 U		2.8	100
Acenaphthylene	0	0.17 J	0	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.34 J		2.9	100
Anthracene	0	1.3	0.55	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.42 J		8.3	100
Benzo(a)anthracene	0	2.3	1.1	0	0.48 U	2.3 U	1.4 U	0.43 U	0.38 J	1.4	X	14	1



Table A-1. Soil Data Table and Chemicals of Potential Concern for Area D AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SS6-2-12	D-SS7-2-12	D-SS8-2-12	D-SS9-2-12	SB-01 (0-1)	SB-02 (0-1)	SB-03 (0-1)	SB-01 (1-5)	SB-02 (1-5)	SB-03 (1-5)	Chemical of Potential Concern	Maximum Detected	NYSDEC / USEPA Residential Soil Standard
Start Depth	2	2	2	2	0	0	0	1	1	1			
End Depth	12	12	12	12	1	1	1	5	5	5			
Depth Unit	in	in	in	in	ft	ft	ft	ft	ft	ft			
Sample Date	8/17/2017	8/17/2017	8/17/2017	8/17/2017	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019			
Benzo(b)fluoranthene	0	2.4	1.2	0.1 J	0.48 U	2.3 U	1.4 U	0.43 U	0.44 J	1.6	X	14	1
Benzo(k)fluoranthene	0	0.72	0.41	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.62	X	6.5	1
Benzo(g,h,i)perylene	0	0.9	0.48	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.68		7.5	100
Benzo(a)pyrene	0	2.1	0.84	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	1.4	X	11	1
Chrysene	0	2.1	1.1	0.078 J	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	1.3	X	12	1
Dibenz(a,h)anthracene	0	0.26 J	0.16 J	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.2 J	X	2.3	0.33
Dibenzofuran	0	0.41	0.15 J	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.43 U		4.8	14
Fluoranthene	0	5.4	2.6	0.084 J	0.48 U	2.3 U	1.4 U	0.43 U	0.71 J	2.9		32	100
Fluorene	0	0.56	0.17 J	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.43 U		7.8	100
Hexachlorobenzene	0	0	0	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.43 U	X	1.2	0.33
Indeno(1,2,3-cd)pyrene	0	1.1	0.54	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.84	X	6.3	0.5
Naphthalene	0	0.25 J	0.085 J	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.43 U		14	100
Pentachlorophenol	0	0	0	0	2.5 U	12 U	7 U	2.2 U	6.2 U	2.2 U		2.2	2.4
Phenanthrene	0	5.1	2.3	0.11 J	0.48 U	2.3 U	1.4 U	0.43 U	0.42 J	0.8	X	38	100
Phenol	0	0	0	0	0.48 U	2.3 U	1.4 U	0.43 U	1.2 U	0.43 U		2.3	100
Pyrene	0	4.4	2.1	0.073 J	0.48 U	2.3 U	1.4 U	0.43 U	0.63 J	2.4		26	100
Acetone												0.69	100
Benzene												0.00097	2.9
n-Butylbenzene												0.015	100
sec-Butylbenzene												0.038	100
tert-Butylbenzene												0.0096	100
1,4-Dichlorobenzene (p-DCB)												0.0019	13
cis-1,2-Dichloroethene												0.0036	100
Ethylbenzene												0.00048	41
Methyl ethyl ketone												0.2	100
Methylene chloride												0.0028	51
n-Propylbenzene												0.012	100
Tetrachloroethene (PCE)												0.044	5.5
Toluene												0.0015	100
1,2,4-Trimethylbenzene												0.014	52
1,3,5-Trimethylbenzene												0.0061	52
Vinyl chloride												0.0035	0.9
Total Xylene												0.0038	100

Footnotes:

(1) Calcium, iron, magnesium, potassium and sodium excluded as COCs.

General Notes:

1. Units are milligrams per kilogram (mg/kg); refer to original reports for data qualifier codes.
2. Only analytes detected in soil are presented here.
3. Analytes included as COPCs if maximum detected concentration exceeds residential soil standards.
4. Several analytes evaluated as COPCs for other AOCs were included as COPCs even though concentrations do not exceed residential soil standards.

***Appendix A-2 Area C – Cottonwood Copse AOC***

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-4	SS-5	SS-31Z	SS-32Z	SS-38Z	SS-39Z	SS-40Z	SS-41Z	SS-41ZRE
Start Depth	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	7/27/1989	7/27/1989	9/13/1994	9/13/1994	9/13/1994	9/13/1994	9/12/1994	9/12/1994	9/12/1994
Analyte									
Aluminum	4950 E	4610 E	13600	29900	15500	8900	4010	2570	
Antimony	9 BN		9.5 B		9.2 B				
Arsenic	5.2 BN	3.3 BN	5.9	2.8	4	4.2	3.9	3.8	
Barium	159 E	75 E	176	267	221	72.1	42.6	35.7 B	
Beryllium	0.71	0.62	3.5	7.6	2.7	0.94 B	0.87 B		
Cadmium			1.2 B		0.9 B	0.97 B	1.1	0.6 B	
Calcium	40.8	38900	82100	2E+05	93500	31400	38400	30400	
Chromium	303 N	7.4 N	24.7	13.7	14.1	16.2	14.5	6.6	
Cobalt	59.6 EN	25.7 EN			4.9 B	7 B	5.6 B		
Copper	121 E	132 E	75.7 R	26.8 R	19 R	18.6 R	38.4 R	23.4 R	
Total Cyanide	5.2 N	2.1 N		8.4 E			11.3 E		
Iron	23600	10400	17400	9020	12800	16500	18500	8580	
Lead	132	36.5	203 R	159 R	62.8 R	36.8	75.9 R	61.6 R	
Magnesium	9990 E	12400 E	20100	41900	16900	9160	7820	6870	
Manganese	337	378	1250	1650	1560	519	458	227	
Mercury	0.22	0.34	0.22	0.12					
Nickel	15.1 N	6.7 N	1		8.9	10.5			
Potassium	991	652	1380	2170	2090	1790	762 B	486 B	
Selenium		3.6 BW		2.1					
Silver									
Sodium	452	133		1290					
Thallium									
Vanadium	11.2	6.6	19.2	10.6	17.5	21.7	19.9	9.6 B	
Zinc	284	166	193	117	69.4	80.5	108	83.4	
Aroclor 1254									
Aroclor 1260				0.035 J	0.16				
beta-BHC		0.083 B							
alpha-Chlordane			0.003 R						
gamma-Chlordane									

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	SS-4	SS-5	SS-31Z	SS-32Z	SS-38Z	SS-39Z	SS-40Z	SS-41Z	SS-41ZRE
Start Depth	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	7/27/1989	7/27/1989	9/13/1994	9/13/1994	9/13/1994	9/13/1994	9/12/1994	9/12/1994	9/12/1994
4,4'-DDT (p,p'-DDT)			0.001 R						
4,4'-DDE (p,p'-DDE)									
4,4'-DDD (p,p'-DDD)			0.013						
Dieldrin			0.023 P		0.01 P	0.004 R		0.006	
Endosulfan sulfate									
Endrin			0.006						
Endrin aldehyde								0.004 R	
Endrin ketone									
Heptachlor epoxide									
Acenaphthene				0.038 J					
Acenaphthylene			0.12 J	0.063 J	0.042 J				0.042 J
Anthracene	0.045 J	0.099 J	0.14 J	0.11 J	0.068 J	0.042 J	0.049 J		0.079 J
Benzo(a)anthracene	0.14 J	0.23 J	0.54	0.45	0.28 J	0.13 J	0.17 J		0.36
Benzo(b)fluoranthene	0.31 J	0.61	0.72	0.58	0.4	0.14 J	0.23 J		0.46
Benzo(k)fluoranthene			0.51	0.58	0.21 J	0.13 J	0.26 J		0.52
Benzo(g,h,i)perylene		0.13 J	0.17 J	0.12 J	0.13 J	0.05 J	0.038 J		0.085 J
Benzo(a)pyrene		0.27 J	0.57	0.52	0.29 J	0.12 J	0.18 J		0.36
Bis(2-ethylhexyl)phthalate	0.32 J		0.32 J	0.086 J	0.096 J	0.14 J	0.092 J		0.22 J
Butyl benzyl phthalate									
Carbazole									
Chrysene	0.17 J	0.24 J	0.62	0.49	0.36	0.16 J	0.22 J		0.43
Dibenz(a,h)anthracene									
Dibenzofuran									
Diethyl phthalate					0.048 J		0.59		
Dimethyl phthalate							0.16 J		
Di-n-butyl phthalate									
Di-n-octyl phthalate									
Fluoranthene	0.31 J	0.55	1.1	0.89	0.58	0.32 J	0.35 J		0.7
Fluorene									
Indeno(1,2,3-cd)pyrene	0.064 J	0.14 J	0.24 J	0.16 J	0.18 J	0.07 J	0.058 J		0.13 J

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-4	SS-5	SS-31Z	SS-32Z	SS-38Z	SS-39Z	SS-40Z	SS-41Z	SS-41ZRE
Start Depth	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	7/27/1989	7/27/1989	9/13/1994	9/13/1994	9/13/1994	9/13/1994	9/12/1994	9/12/1994	9/12/1994
2-Methylnaphthalene					0.045 J				
Naphthalene									0.035 JB
N-Nitrosodi-n-propylamine									
Phenanthrene	0.2 J	0.45	0.56	0.49	0.34 J	0.2 J	0.2 J		0.39
Pyrene	0.27 J	0.47	0.87	0.85	0.43	0.22 J	0.34 J		0.65
Acetone	0.12	0.039							
Benzene									
Chlorobenzene									
1,1-Dichloroethane									
Naphthalene		0.042 J							
Tetrachloroethene (PCE)									
Toluene									

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-43Z	SS-42Z	SS-43A	SS-47Z	SS-49Z	SS-50Z	SS-51Z	SS-51ZDL	SS-57Z
Start Depth	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	9/8/1994	9/12/1994	9/8/1994	9/8/1994	9/8/1994	9/8/1994	9/7/1994	9/7/1994	9/7/1994
Analyte									
Aluminum	14100	7400		4170	2320	2190	2450		
Antimony	7.1 B								
Arsenic	3.2	2.9		3.6	2.8	1.3 B	2.1 E		
Barium	135	69.4		50.9	26.5 B	14.1 B	49.8		
Beryllium	1.6	1 B							
Cadmium		0.75 B		2.1	0.56 B				
Calcium	87200	50300		19700	25300	45000	21100		
Chromium	21.8	11.9		1	6.9	6.2	4.6		
Cobalt	5.9 B	5.2 B							
Copper	18.1 R	16 R		12.3 R	31.2 R	8.9 R	16		
Total Cyanide	0.83 R			0.8 R					
Iron	17000	13600		26800	6230	5750	4590		
Lead	39.4 E	50.2		47.2 E	477 E	11.9	62.5		
Magnesium	20500	15300		2760	9790	19800	5150		
Manganese	978	444		522	162	182	152 E		
Mercury							0.38		
Nickel	12.6			8.3					
Potassium	1870	1860		385 B	387 B	660 B	323 B		
Selenium									
Silver									
Sodium									
Thallium									
Vanadium	23.1	18.6		16.1	7.1 B	8.3 B	7.2 B		
Zinc	81.6	72.8		74.7	91.3	54.9	80.6		
Aroclor 1254									
Aroclor 1260									
beta-BHC									
alpha-Chlordane								0.13 PE	
gamma-Chlordane								0.091 PE	

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	SS-43Z	SS-42Z	SS-43A	SS-47Z	SS-49Z	SS-50Z	SS-51Z	SS-51ZDL	SS-57Z
Start Depth	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	9/8/1994	9/12/1994	9/8/1994	9/8/1994	9/8/1994	9/8/1994	9/7/1994	9/7/1994	9/7/1994
4,4'-DDT (p,p'-DDT)								0.3 DE	
4,4'-DDE (p,p'-DDE)									
4,4'-DDD (p,p'-DDD)									
Dieldrin		0.001 P							
Endosulfan sulfate									
Endrin									
Endrin aldehyde	0.006 R			0.004 R	0.006 R	0.006			0.003 JP
Endrin ketone									
Heptachlor epoxide									
Acenaphthene		0.089 J					0.3 J		
Acenaphthylene		0.092 J		0.046 J			0.01 J		
Anthracene	0.038 J	0.22 J					0.61 J		
Benzo(a)anthracene	0.22 J	0.49		0.13 J	0.079 J	0.044 J	2.5		
Benzo(b)fluoranthene	0.25 J	0.44		0.18 J	0.075 J	0.05 J	2.3		
Benzo(k)fluoranthene	0.18 J	0.85		0.14 J	0.07 J	0.038 J	1.5		
Benzo(g,h,i)perylene	0.11 J	0.075 J		0.074 J					
Benzo(a)pyrene	0.17 J	0.39		0.12 J	0.061 J	0.038 J	0.1		
Bis(2-ethylhexyl)phthalate	0.15 J	0.36 J		0.068 J	0.19 J	0.17 J	0.23 J		0.18 J
Butyl benzyl phthalate									
Carbazole		0.052 J					0.16 J		
Chrysene	0.28 J	0.52		0.18 J	0.096 J	0.049 J	2.7		
Dibenz(a,h)anthracene	0.051 J						0.39 J		
Dibenzofuran		0.072 J					0.18 J		
Diethyl phthalate		0.076 J			0.18 J		0.087 J		
Dimethyl phthalate									
Di-n-butyl phthalate	0.38				0.28 J	0.3 J			
Di-n-octyl phthalate		0.07 J							
Fluoranthene	0.34 J	1.1		0.22 J	0.15 J	0.076 J	4.8		
Fluorene		0.13 J					0.36 J		
Indeno(1,2,3-cd)pyrene	0.13 J	0.12 J		0.084 J	0.037 J		0.74		

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-43Z	SS-42Z	SS-43A	SS-47Z	SS-49Z	SS-50Z	SS-51Z	SS-51ZDL	SS-57Z
Start Depth	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	9/8/1994	9/12/1994	9/8/1994	9/8/1994	9/8/1994	9/8/1994	9/7/1994	9/7/1994	9/7/1994
2-Methylnaphthalene	0.067 J				0.039 J			0.078 J	
Naphthalene	0.046 J				0.05 J			0.01 J	
N-Nitrosodi-n-propylamine									
Phenanthrene	0.18 J	0.99			0.15 J	0.072 J	0.039 J	2.8	
Pyrene	0.33 J	0.97			0.21 J	0.14 J	0.073 J	3.2	
Acetone									
Benzene			0.002 J						
Chlorobenzene			0.002 J						
1,1-Dichloroethane			0.001 J						
Naphthalene									
Tetrachloroethene (PCE)			0.001 J						
Toluene			0.002 J						



Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-59Z	SS-59ZDL	PZ-008-0.0-8.0	SB-016-5.0-7.0	SB-030-0.0-8.0	SB-034-0.0-8.0	SB-034-8.0-10.0	SB-037-0.0-8.0	SB-052-0.0-8.0
Start Depth	0	0	0	5	0	0	8	0	0
End Depth	1	1	8	7	8	8	10	8	8
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	9/7/1994	9/7/1994	9/22/1994	4/22/1991	8/17/1994	9/9/1994	9/9/1994	9/1/1994	8/18/1994
Analyte									
Aluminum			2650		6630	7500	3990	6470	5760
Antimony					11.4 B	6.4 B	9.7 B		
Arsenic			2 E		5.1	4.3	3.2	4.3	4.5
Barium			12 B		75	53.5	26.8 B	85.4 E	50.6
Beryllium									
Cadmium					0.97 B		0.76 B		0.56 B
Calcium			53200 E		70000	72800		51900	46100
Chromium			5.3		9.2	9	7.3	9.5	16.9
Cobalt			2.7 B		5.4 B	4.8 B			
Copper			6.2 E		311	16.5 R	6.8 R	17.9	26.4
Total Cyanide					2 R				1 R
Iron			5880		25900	10100	15900	16600	17300
Lead			8.2	60	79.2	36.2 E	16.9	37.7	78.3
Magnesium			17400		10000	11900	43500	12200	12600
Manganese			192 E		624	303	1450	563	448
Mercury					0.29				
Nickel			5.6 B		13	10.5		9.8	13.9
Potassium			675 B		1070 B	923 B	783 B	927 B	735 B
Selenium									
Silver									
Sodium			110 B						
Thallium									
Vanadium			10.3		21.6	13.5	15.7	15.9	18.8
Zinc			35 E		146	64.3	45.8	106	136
Aroclor 1254									
Aroclor 1260					0.081				
beta-BHC									
alpha-Chlordane		0.26 PE							
gamma-Chlordane		0.25 PE							

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	SS-59Z	SS-59ZDL	PZ-008-0.0-8.0	SB-016-5.0-7.0	SB-030-0.0-8.0	SB-034-0.0-8.0	SB-034-8.0-10.0	SB-037-0.0-8.0	SB-052-0.0-8.0
Start Depth	0	0	0	5	0	0	8	0	0
End Depth	1	1	8	7	8	8	10	8	8
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	9/7/1994	9/7/1994	9/22/1994	4/22/1991	8/17/1994	9/9/1994	9/9/1994	9/1/1994	8/18/1994
4,4'-DDT (p,p'-DDT)		0.36 DE							
4,4'-DDE (p,p'-DDE)					0.027 Y				
4,4'-DDD (p,p'-DDD)									
Dieldrin									
Endosulfan sulfate									
Endrin									
Endrin aldehyde						0.004 R			
Endrin ketone									
Heptachlor epoxide									
Acenaphthene									
Acenaphthylene								0.043 J	
Anthracene	0.13 J					0.063 J		0.047 J	0.072 J
Benzo(a)anthracene	0.76				0.16 J	0.27 J	0.12 J	0.21 J	0.22 J
Benzo(b)fluoranthene	0.55 J				0.26 J	0.27 J	0.1 J	0.26 J	0.15 J
Benzo(k)fluoranthene	0.56 J				0.13 J	0.19 J	0.09 J	0.22 J	0.18 J
Benzo(g,h,i)perylene						0.058 J	0.055 J	0.069 J	
Benzo(a)pyrene	0.26 J				0.14 J	0.19 J	0.082 J	0.21 J	0.2 J
Bis(2-ethylhexyl)phthalate	0.19 J		0.066 J					0.042 J	0.053 J
Butyl benzyl phthalate									
Carbazole									
Chrysene	0.8				0.24 J	0.3 J	0.15 J	0.23 J	0.26 J
Dibenz(a,h)anthracene	0.11 J								
Dibenzofuran									
Diethyl phthalate			0.33 J						0.087 J
Dimethyl phthalate									
Di-n-butyl phthalate									
Di-n-octyl phthalate									
Fluoranthene	1.5				0.4 J	0.54	0.25 J	0.46	0.28 J
Fluorene	0.08 J								0.043 J
Indeno(1,2,3-cd)pyrene	0.19 J					0.075 J	0.06 J	0.082 J	

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-59Z	SS-59ZDL	PZ-008-0.0-8.0	SB-016-5.0-7.0	SB-030-0.0-8.0	SB-034-0.0-8.0	SB-034-8.0-10.0	SB-037-0.0-8.0	SB-052-0.0-8.0
Start Depth	0	0	0	5	0	0	8	0	0
End Depth	1	1	8	7	8	8	10	8	8
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	9/7/1994	9/7/1994	9/22/1994	4/22/1991	8/17/1994	9/9/1994	9/9/1994	9/1/1994	8/18/1994
2-Methylnaphthalene									
Naphthalene									0.072 J
N-Nitrosodi-n-propylamine									
Phenanthrene	0.78				0.25 J	0.28 J	0.11 J	0.16 J	0.24 J
Pyrene	0.89				0.5 J	0.48	0.21 J	0.38	0.56
Acetone									
Benzene									
Chlorobenzene									
1,1-Dichloroethane									
Naphthalene									
Tetrachloroethene (PCE)									
Toluene									

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	SB-053-0.0-8.0	SB-054-0.0-8.0	SB-055-0.0-8.0	SB-056-0.0-8.0	SB-057-0.0-8.0	Chemical of Potential Concern	Maximum Detected	2018 Soil Data Maximum Detected <sup>(2)</sup>	NYSDEC / USEPA Residential Soil Standard
Start Depth	0	0	0	0	0				
End Depth	8	8	8	8	8				
Depth Unit	ft	ft	ft	ft	ft				
Sample Date	8/22/1994	8/18/1994	8/23/1994	8/23/1994	8/24/1994				
Analyte									
Aluminum	3540	4880	3120	3260	3890	X	29900	14800	7,700
Antimony						X	11.4	<3.5	3.1
Arsenic	3.6	3.7	2.6	3.4	3.4	X	5.9	4.32	16
Barium	24.7 B	115	34.5 B	14.5 B	28.3 BE	X	267	229	350
Beryllium							7.6	2.81	14
Cadmium						X	2.1	<ND	2.5
Calcium	29800	1E+05	34000	40700	37900	<sup>(1)</sup>	163000		
Chromium	7.2	7.9	7.7	6.5	7.1 R	X	303	15.3	36
Cobalt						X	59.6	4.35	2.3
Copper	12.9 E	44.3	49.7 E	9.9 E	22.2 R	X	311	57.3	270
Total Cyanide							11.3	25	27
Iron	10200	11300	8560	8250	10100	<sup>(1)</sup>	26800		
Lead	71.7	253	44.6	10.4	45.7	X	477	172	400
Magnesium	9050	9980	13500	8770	8580	<sup>(1)</sup>	43500		
Manganese	271	579	256	252	261 E	X	1650	899	2,000
Mercury		0.14	0.12		0.13	X	0.38	0.457	0.81
Nickel		13		9.1	14.8		15.1	13.4	140
Potassium	729 B	1120 B	574 B	630 B	818 B	<sup>(1)</sup>	2170		
Selenium							3.6		36
Silver							0	0.817	36
Sodium			1910			<sup>(1)</sup>	1910		
Thallium						X	0	3.22	0.078
Vanadium	11.1	16.4	11.9	11.3	14.3		23.1	11.5	39
Zinc	54.4	115	120	45.4	70.1 E	X	284	212	2,200
Aroclor 1254			0.016 JP				0.016		1
Aroclor 1260						X	0.16	1.67	1
beta-BHC							0.083		0.36
alpha-Chlordane							0.26		0.91
gamma-Chlordane							0.25	0.004	1.7

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	SB-053-0.0-8.0	SB-054-0.0-8.0	SB-055-0.0-8.0	SB-056-0.0-8.0	SB-057-0.0-8.0	Chemical of Potential Concern	Maximum Detected	2018 Soil Data Maximum Detected <sup>(2)</sup>	NYSDEC / USEPA Residential Soil Standard
Start Depth	0	0	0	0	0				
End Depth	8	8	8	8	8				
Depth Unit	ft	ft	ft	ft	ft				
Sample Date	8/22/1994	8/18/1994	8/23/1994	8/23/1994	8/24/1994				
4,4'-DDT (p,p'-DDT)	0.004						0.36	0.232	1.7
4,4'-DDE (p,p'-DDE)							0.027		1.8
4,4'-DDD (p,p'-DDD)			0.017				0.017		2.6
Dieldrin							0.023	0.033	0.039
Endosulfan sulfate							0	0.061	4.8
Endrin							0.0057	0.157	2.2
Endrin aldehyde		0.006 P					0.0062		1.9
Endrin ketone							0	0.048	2.2
Heptachlor epoxide							0	0.049	0.07
Acenaphthene							0.3		100
Acenaphthylene				0.042 J			0.12		100
Anthracene	0.048 J		0.089 J	0.057 J	0.051 J		0.61		100
Benzo(a)anthracene	0.16 J	0.12 J	0.37 J	0.29 J	0.15 J	X	2.5	0.666	1
Benzo(b)fluoranthene	0.18 J	0.11 J	0.42	0.3 J	0.14 J	X	2.3	0.767	1
Benzo(k)fluoranthene	0.096 J	0.068 J	0.29 J	0.18 J	0.13 J	X	1.5	0.488	1
Benzo(g,h,i)perylene			0.23 J		0.058 J		0.23	0.492	100
Benzo(a)pyrene	0.16 J	0.094 J	0.39 J	0.28 J	0.15 J	X	0.57	0.643	1
Bis(2-ethylhexyl)phthalate	0.095 J	0.048 J	0.11 J	0.14 J			0.36		39
Butyl benzyl phthalate		0.076 J					0.076		290
Carbazole							0.16		27
Chrysene	0.22 J	0.16 J	0.47	0.33 J	0.18 J	X	2.7	0.791	1
Dibenz(a,h)anthracene						X	0.39		0.33
Dibenzofuran							0.18		14
Diethyl phthalate				0.3 J			0.59		5,000
Dimethyl phthalate							0.16		5,000
Di-n-butyl phthalate			0.077 J				0.38		630
Di-n-octyl phthalate							0.07		63
Fluoranthene	0.31 J	0.25 J	0.76	0.49	0.33 J		4.8	1.51	100
Fluorene			0.041 J				0.36		100
Indeno(1,2,3-cd)pyrene			0.27 J		0.099 J	X	0.74	0.481	0.5

Table A-2. Soil Data Table and Chemicals of Potential Concern for Area C - Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SB-053-0.0-8.0	SB-054-0.0-8.0	SB-055-0.0-8.0	SB-056-0.0-8.0	SB-057-0.0-8.0	Chemical of Potential Concern	Maximum Detected	2018 Soil Data Maximum Detected <sup>(2)</sup>	NYSDEC / USEPA Residential Soil Standard
Start Depth	0	0	0	0	0				
End Depth	8	8	8	8	8				
Depth Unit	ft	ft	ft	ft	ft				
Sample Date	8/22/1994	8/18/1994	8/23/1994	8/23/1994	8/24/1994				
2-Methylnaphthalene							0.078		24
Naphthalene	0.039 J		0.087 J		0.038 J		0.087		100
N-Nitrosodi-n-propylamine	0.34 J					X	0.34		0.078
Phenanthrene	0.26 J	0.18 J	0.3 J	0.18 J	0.24 J		2.8	1.12	100
Pyrene	0.45	0.46	0.87	0.73	0.24 J		3.2	1.32	100
Acetone							0.12		100
Benzene							0.002		2.9
Chlorobenzene							0.002		100
1,1-Dichloroethane							0.001		19
Naphthalene							0.042		100
Tetrachloroethene (PCE)							0.001		5.5
Toluene							0.002		100

Footnotes:

<sup>(1)</sup> Calcium, iron, magnesium, potassium and sodium excluded as COCs.

<sup>(2)</sup> Limited Phase II Environmental Site Assessment by Ravi Engineering (October 2018), including five surface soil samples and five subsurface soil samples. Soil analytical data included in Ravi (2018) report.

General Notes:

1. Units are milligrams per kilogram (mg/kg); refer to original reports for data qualifier codes.
2. Only analytes detected in soil are presented here.
3. Analytes included as COPCs if maximum detected concentration exceeds residential soil standards.
4. Several analytes evaluated as COPCs for other AOCs were included as COPCs even though concentrations do not exceed residential soil standards.
5. Due to small data sets, blank contamination and data quality concerns associated with older data, Area C - South and East of Cottonwood Copse AOC analytical data applied to cobalt and thallium.

***Appendix A-3 Area C – South and East of Cottonwood Copse AOC***

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-37Z	SS-44Z	SS-45Z	SS-46Z	SS-46ZRE	SS-53ZRE	SS-54ZRE	SS-55Z	SS-56Z	SS-60Z	SS61Z	SS-61ZRE	SS-62Z	SS-63Z												
Start Depth	0	0	0	0	0	0	0	0	0	0	0	0	0	0												
End Depth	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft												
Sample Date	9/8/1994	9/7/1994	9/9/1994	9/2/1994	9/2/1994	9/2/1994	9/2/1994	8/30/1994	8/30/1994	9/1/1994	8/30/1994	8/30/1994	8/30/1994	8/30/1994												
Analyte																										
Aluminum	5790	3640	1380	6110	E																					
Antimony		11.9	B																							
Arsenic	2.5	3.3	E	2.2	2.5	E																				
Barium	32.1	B	23.5	B	13.1	B	25.2	B																		
Beryllium																										
Cadmium																										
Calcium	53300	35000	14200	60800																						
Chromium	7.9	7.7	3.4	8.7																						
Hexavalent Chromium																										
Cobalt																										
Copper	15	R	12.3	9	R	14																				
Total Cyanide																										
Iron	8590	7870	4200	12000																						
Lead	27.9	17	22.7	17.3																						
Magnesium	16400	9700	3680	20900																						
Manganese	337	314	E	150	447	E																				
Mercury																										
Nickel	11.1	9.8		13.6	E																					
Potassium	1020	B	787	B	772	B																				
Selenium																										
Silver																										
Sodium																										
Thallium																										
Vanadium	13.7	10.9		18.7																						
Zinc	67.6	54.5	58.1	10																						
Aroclor 1254																										
Aroclor 1260												0.036	JP	0.061	0.026	JP										
gamma-BHC (Lindane)																										
alpha-Chlordane																										
4,4'-DDT (p,p'-DDT)													0.014	Y												
4,4'-DDE (p,p'-DDE)													0.0075													
4,4-DDD (p,p-DDD)													0.0046													
Dieldrin																										
beta-Endosulfan (II)																										
Endrin																										
Endrin aldehyde	0.004	R	0.017	PE	0.0093	0.006	R							0.015	R	0.015	R									
Acenaphthene										0.052	J			0.046	J	0.21	J									
Acenaphthylene					0.046	J																				
Anthracene			0.059	J			0.052	J	0.058	J		0.12	J	0.01	J		0.2	J	0.35	J						
Benzo(a)anthracene	0.5		0.059	J		0.038	J	0.16	J	0.17	J	0.038	J	0.093	J	0.36	J	0.36	J	0.76	0.74	J				
Benzo(b)fluoranthene	0.35	J		0.063	J		0.044	J	0.34	J	0.21	J	0.059	J	0.15	J	0.34	J		0.34	J	0.44	J			
Benzo(k)fluoranthene	0.34	J		0.055	J		0.055	J	0.4		0.27	J	0.068	J	0.15	J	0.28	J	0.098	J		0.5				
Benzo(g,h,i)perylene	0.15	J						0.045	J					0.16	J	0.088	J			0.14	J	0.26	J			
Benzo(a)pyrene	0.34	J		0.044	J		0.039	J	0.2	J	0.16	J	0.042	J	0.01	J	0.32	J	0.36	J		0.51	0.77	J		
Bis(2-ethylhexyl)phthalate	0.2	J	0.36	J	0.27	J		0.17	JB	0.12	JB	0.36	JB	0.096	J	0.14	J	0.01	J	0.51	J		0.37	J	1.4	J



Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-37Z	SS-44Z	SS-45Z	SS-46Z	SS-46ZRE	SS-53ZRE	SS-54ZRE	SS-55Z	SS-56Z	SS-60Z	SS61Z	SS-61ZRE	SS-62Z	SS-63Z
Start Depth	0	0	0	0	0	0	0	0	0	0	0	0	0	0
End Depth	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	9/8/1994	9/7/1994	9/9/1994	9/2/1994	9/2/1994	9/2/1994	9/2/1994	8/30/1994	8/30/1994	9/1/1994	8/30/1994	8/30/1994	8/30/1994	8/30/1994
Carbazole														0.081 J
Chrysene	0.53	0.08 J	0.082 J		0.052 J	0.22 J	0.2 J	0.059 J	0.13 J	0.36 J	0.4 J		0.81	0.86 J
Dibenz(a,h)anthracene	0.064 J									0.07 J				
Dibenzofuran														
Diethyl phthalate							0.046 J		0.18 J					
Dimethyl phthalate														
Di-n-butyl phthalate	0.3 J													
Fluoranthene	0.88	0.01 J	0.12 J		0.075 J	0.3 J	0.39	0.086 J	0.17 J	0.9	0.74 J		1.6	2.1
Fluorene							0.04 J			0.058 J				0.26 J
Indeno(1,2,3-cd)pyrene	0.18 J					0.074 J	0.047 J		0.04 J	0.16 J	0.14 J		0.24 J	0.36 J
2-Methylnaphthalene						0.071 J							0.048 J	
3,4-Methylphenol														
4-Methylphenol														
Naphthalene						0.038 J							0.04 J	
Phenanthrene	0.11 J		0.064 J		0.049 J	0.22 J	0.3 J	0.058 J	0.078 J	0.64	0.36 J		0.82	2
Phenol														
Pyrene	0.8	0.085 J	0.01 J		0.091 J	0.34 J	0.4	0.077 J	0.15 J	0.74	0.62 J		1.3	1.5 J
Acetone														
Methylene chloride														
Toluene														

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-64Z	SS-65Z	SS-66Z	SS-67	SS-67Z	SS-68Z	SS-69Z	SS-70A	SS-70Z	SS-71Z	SS-72Z	SB-8-5.0-7.0	SB-15-5.0-7.0	SB-031-0.0-8.0
Start Depth	0	0	0	0	0	0	0	0	0	0	0	5	5	0
End Depth	1	1	1	1	1	1	1	1	1	1	1	7	7	8
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/29/1994	8/29/1994	8/29/1994	8/29/1994	8/29/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	8/30/1994	8/30/1994	7/12/1989	7/13/1989	8/25/1994
Analyte														
Aluminum						4880	7170		5400	22900	8370	4280	7760	5900
Antimony												0 N	10 N	37 E
Arsenic						4.6	7.3		6.7		6.3	1.8 B	8.9 B	20.9
Barium						70.3	71 E		93 E	286	117 E	30.1 E	445 E	449 E
Beryllium										3.2		0.5	0.71	
Cadmium							0.9 BE		0.91 BE	2.5 E	0.72 BE	0 N	2 N	3.3
Calcium						41100	80300		144000	124000	52900	79000	36500	11400
Chromium						9.3	13.5		9.6	61.5	28.9	8.5	18.5	35.1 R
Hexavalent Chromium														
Cobalt							5.9 B				5.6 B	28.8 E	43.8 E	7.6 B
Copper						50.5	27.4		30.3	187	125	19.6	145	340 R
Total Cyanide											1.3 R			
Iron						12800	15400		10300	9670	27200	8230	11500	27200
Lead						177	75.9		193	268	95.2	12	5530	700
Magnesium						7430	31500		60400	16200	8080	16600	3780	2420
Manganese						323	398		489	3350	702	362	149	198 E
Mercury						0.31	0.27		0.2	0.18	0.75	0 N	1.1 N	2
Nickel						14.3	18.2		16.8	11.6	20.4	8.5	22.6	48.1
Potassium						643 B	1090		657 B	1680	882 B	1160	713	612 B
Selenium										1.5		0 N	1.8 N	2.2
Silver														
Sodium									818 B			182 E	584 B	
Thallium												3.1 BN	3.7 BN	
Vanadium						11.5 B	21.2		12.1	10.2 B	18.8	9.5	30.9	24.4
Zinc						185	115		127	384	219	42.7	1030	2840 E
Aroclor 1254														
Aroclor 1260	0.023 JP		0.027 JP				0.083 JP			0.037 JP				
gamma-BHC (Lindane)														
alpha-Chlordane														
4,4'-DDT (p,p'-DDT)									0.054		0.0041 P			
4,4'-DDE (p,p'-DDE)									0.016 J					
4,4-DDD (p,p-DDD)														
Dieldrin														
beta-Endosulfan (II)														
Endrin														
Endrin aldehyde														
Acenaphthene		0.061 J		0.26 J		0.099 J			0.096 J				0 D	0.35 J
Acenaphthylene		0.042 J							0.041 J	0.041 J			0 D	0.37 J
Anthracene		0.15 J			0.6 J	0.17 J	0.14 J		0.19 J	0.057 J		0.02 J	0.19 JD	1.4 J
Benzo(a)anthracene	0.042 J	0.48	0.2 J		1.4	0.57	0.66 J		0.58	0.33 J	0.057 J	0.051 J	0.45 JD	3.1
Benzo(b)fluoranthene	0.089 J	0.6	0.33 J		1.5	0.61	0.86		0.59	0.51	0.069 J	0.083 J	0.72 JD	3.6
Benzo(k)fluoranthene	0.061 J	0.5	0.37 J		1.6	0.54	0.75 J		0.54	0.38 J	0.054 J		0 D	2.5
Benzo(g,h,i)perylene		0.079 J			0.2 J	0.18 J	0.29 J		0.21 J	0.17 J			0 D	0.64 J
Benzo(a)pyrene	0.043 J	0.47	0.21 J		1.2	0.57	0.79 J		0.58	0.35 J	0.053 J	0.058 J	0.36 JD	2.7
Bis(2-ethylhexyl)phthalate	0.32 J	0.61	0.1		0.48 J	0.18 J	0.23 J		0.19 J	0.58		0.81	0 D	4.5 B

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-64Z	SS-65Z	SS-66Z	SS-67	SS-67Z	SS-68Z	SS-69Z	SS-70A	SS-70Z	SS-71Z	SS-72Z	SB-8-5.0-7.0	SB-15-5.0-7.0	SB-031-0.0-8.0
Start Depth	0	0	0	0	0	0	0	0	0	0	0	5	5	0
End Depth	1	1	1	1	1	1	1	1	1	1	1	7	7	8
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/29/1994	8/29/1994	8/29/1994	8/29/1994	8/29/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	8/30/1994	8/30/1994	7/12/1989	7/13/1989	8/25/1994
Carbazole		0.043 J			0.19 J				0.052 J					0.29 J
Chrysene	0.056 J	0.52	0.26 J		1.4	0.57	0.72 J		0.59	0.44	0.062 J	0.059 J	0.56 JD	3.2
Dibenz(a,h)anthracene						0.084 J	0.12 J		0.094 J	0.085 J			0 D	0.29 J
Dibenzofuran		0.054 J			0.28 J	0.054 J			0.071 J				0 D	0.44 J
Diethyl phthalate										0.21 J	0.075 J		0 D	
Dimethyl phthalate										0.042 J				
Di-n-butyl phthalate													0 D	
Fluoranthene	0.086 J	0.94	0.49 J		2.7	1.3	1.4		1.4	0.75	0.11 J	0.13 J	0.9 JD	6.4
Fluorene		0.066 J			0.42 J	0.073 J			0.097 J				0 D	0.81 J
Indeno(1,2,3-cd)pyrene		0.16 J			0.36 J	0.2 J	0.29 J		0.21 J	0.22 J	0.041 J		0 D	1.2 J
2-Methylnaphthalene		0.038 J		0.17 J						0.052 J			0 D	0.26 J
3,4-Methylphenol														
4-Methylphenol													0 D	
Naphthalene				0.15 J		0.06 J			0.074 J	0.044 J			0 D	0.29 J
Phenanthrene	0.042 J	0.58	0.3 J		2.6	0.77	0.67 J		0.99	0.41	0.07 J	0.089 J	1.1 JD	5.3
Phenol													0 D	
Pyrene	0.082 J	0.81	0.41 J		2.3	0.1	1.2		1.1	0.64	0.01 J	0.13 J	1 JD	5.6
Acetone												1.3 D	0.33 D	
Methylene chloride								0.009 JB						
Toluene												0.024 JD	0 D	

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	SB-032-0.0-8.0	SB-033-0.0-8.0	SB-035-0.0-8.0	SB-035-8.0-10.0	SB-036-0.0-8.0	SB-038-0.0-8.0	SB-039-0.0-8.0	SB-058-0.0-8.0	SB-059-0.0-8.0	SB-060-0.0-8.0	SB-061-0.0-8.0	SB-062-0.0-8.0	SB-063-0.0-8.0	SB-064-0.0-8.0
Start Depth	0	0	0	8	0	0	0	0	0	0	0	0	0	0
End Depth	8	8	8	10	8	8	8	8	8	8	8	8	8	8
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	9/8/1994	8/17/1994	8/16/1994	8/16/1994	8/18/1994	8/24/1994	9/2/1994	8/26/1994	8/29/1994	8/29/1994	8/31/1994	8/31/1994	9/1/1994	9/1/1994
Analyte														
Aluminum	4300	8370	3310	2940	3950	4200	16200 E	3100	5920	2900	2190	3820	3840	3410
Antimony	13.1 B					8.2 BE				20.1 E				
Arsenic	7	4.7	2.8	3	3	22.8	13 E	2.3	7.6	17.9	1.4 B	2.8	2	3.4
Barium	314	191	22.9 B	13.2 B	35.4 B	451 E	180	28.2 BE	173	129	12.3 BE	15.8 BE	18.5 BE	18.6 BE
Beryllium							2.3							
Cadmium	1.4	2.8		0.42 B		2 E	0.93 BE			1.5				
Calcium	33800	82800	47700	33700	51900	9550	102000	45900	15500	25500	44400	37600	37600	48100
Chromium	85.5	11.9	5.7	5.4	7.9	26.6 R	17.3	8.1 R	12.1	15.3	5.1	6.5	12.6	6.5
Hexavalent Chromium														
Cobalt	6.6 B					7.5 B								
Copper	110 R	126	8.7	7.3	16.9	82 E	28.1 E	19.6 R	270 E	84.9 E	5.3	11.5	12	12.7
Total Cyanide		0.71 R										2.8 R		
Iron	13300	19700	8400	8490	8310	39600	13300 E	8630	9900	12400	6170	8800	8360	9210
Lead	504 E	337	32.2	6.1	35.7	1200	125	20.5	439 E	441 E	7.3	11.1	9.1	12.5
Magnesium	9000	24400	9600	5970	9180	1300	13200	13800	3140	9270	17300	8260	8300	14200
Manganese	229	508	271	228	348	301 E	1200 E	295 E	161	290	188	273	340	280
Mercury	0.19	1				0.68	0.28		0.15	0.7	0.12			0.12
Nickel	24.2	13.9	9.2	9	10.9	21.1	11.1 E	11.1	18.7	12.5		10.9	11.3	11.3
Potassium	841 B	763 B	520 B	548 B	519 B		1760		385 B		460 B	828 B	723 B	709 B
Selenium						6.4 E	1.9 E			2.3 E				
Silver										1.9 BE				
Sodium														
Thallium														
Vanadium	18.3	17.4	10.6	13.3	10.2	23.9	19.6	10.4	16.3	10.6 B	8.2 B	11.9	14.3	11.1
Zinc	344	369	45.1	32.1	68.2	548 E	224	81.9 E	195	302	54.9	48.3	47.3	52.7
Aroclor 1254														
Aroclor 1260		0.19 P	0.048								0.11 P			
gamma-BHC (Lindane)														
alpha-Chlordane														
4,4'-DDT (p,p'-DDT)											0.04 PY			
4,4'-DDE (p,p'-DDE)		0.013 Y												
4,4-DDD (p,p-DDD)		0.02 Y									0.012			
Dieldrin			0.0045 PY											
beta-Endosulfan (II)														
Endrin			0.0047 Y											
Endrin aldehyde				0.0067 P			0.015 P	0.012 R						
Acenaphthene	0.06 J	0.083 J		0.06 J						0.63 J				
Acenaphthylene	0.04 J									0.15 J				
Anthracene	0.14 J	0.19 J	0.5 J	0.054 J		0.049 J			0.081 J	0.95				0.042 J
Benzo(a)anthracene	0.39	0.46	3.3	0.062 J	0.74 J	0.19 J			0.12 J	1.6				0.15 J
Benzo(b)fluoranthene	0.37 J	0.43	1.9	0.056 J	0.4 J	0.25 J			0.32 J	1.7				0.17 J
Benzo(k)fluoranthene	0.34 J	0.24 J	2.2	0.049 J	0.52 J	0.25 J			0.38 J	1.7				0.16 J
Benzo(g,h,i)perylene	0.078 J		0.67 J			0.063 J				0.32 J				0.057 J
Benzo(a)pyrene	0.31 J	0.46	3.2	0.048 J	0.53 J	0.19 J			0.27 J	1.6				0.17 J
Bis(2-ethylhexyl)phthalate	0.075 J		0.17 J						0.095 J					

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SB-032-0.0-8.0	SB-033-0.0-8.0	SB-035-0.0-8.0	SB-035-8.0-10.0	SB-036-0.0-8.0	SB-038-0.0-8.0	SB-039-0.0-8.0	SB-058-0.0-8.0	SB-059-0.0-8.0	SB-060-0.0-8.0	SB-061-0.0-8.0	SB-062-0.0-8.0	SB-063-0.0-8.0	SB-064-0.0-8.0
Start Depth	0	0	0	8	0	0	0	0	0	0	0	0	0	0
End Depth	8	8	8	10	8	8	8	8	8	8	8	8	8	8
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	9/8/1994	8/17/1994	8/16/1994	8/16/1994	8/18/1994	8/24/1994	9/2/1994	8/26/1994	8/29/1994	8/29/1994	8/31/1994	8/31/1994	9/1/1994	9/1/1994
Carbazole		0.05 J								0.24 J				
Chrysene	0.45	0.52	3.9	0.096 J	0.84 J	0.23 J			0.37 J	1.5				0.17 J
Dibenz(a,h)anthracene			0.37 J											
Dibenzofuran	0.063 J	0.07 J								0.4 J				
Diethyl phthalate	0.11 J										0.058 J	0.092 J		0.059 J
Dimethyl phthalate														
Di-n-butyl phthalate	0.4			0.084 J										
Fluoranthene	0.75	1.1	4	0.17 J	1.4 J	0.43			0.4 J	3.2				0.22 J
Fluorene	0.095 J	0.11 J				0.047 J				0.69 J				
Indeno(1,2,3-cd)pyrene	0.1 J	0.35 J	0.9 J			0.12 J			0.1 J	0.55 J				0.067 J
2-Methylnaphthalene	0.13 J					0.047 J				0.18 J				
3,4-Methylphenol														
4-Methylphenol						0.064 J								
Naphthalene	0.15 J	0.055 J				0.055 J				0.33 J				0.041 J
Phenanthrene	0.51	1.1	1.3 J	0.12 J	0.75 J	0.28 J			0.32 J	3.6				0.085 J
Phenol	0.052 J													
Pyrene	0.67	1.4	6.9	0.14 J	1.5 J	0.32 J			0.57 J	3.2				0.18 J
Acetone														
Methylene chloride														
Toluene														

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SB-077-5.0-7.0	SB-078-5.0-7.0	C-SS1-0-2	C-SS2-0-2	C-SS3-0-2	C-SS1-2-12	C-SS2-2-12	C-SS3-2-12	SB-04 (0-1)	SB-05 (0-1)	SB-06 (0-1)	SB-07 (0-1)	SB-08 (0-1)	SB-09 (0-1)
Start Depth	5	5	0	0	0	2	2	2	0	0	0	0	0	0
End Depth	7	7	2	2	2	12	12	12	1	1	1	1	1	1
Depth Unit	ft	ft	in	in	in	in	in	in	ft	ft	ft	ft	ft	ft
Sample Date	6/19/1995	6/19/1995	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/30/2017	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019
Analyte														
Aluminum			14000	13200	16100	19000	17000	22700	7520	7600	8650	10100	15600	12800
Antimony			0	1.9 J	0	0	2.1 J	1.2 J	8.1 U	7.6 U	0.9 BJ	6.8 U	7.6 U	6.1 BJ
Arsenic			7.8	10	9.2	7.4	14.6	11.2	5	5	9.9	5.5	6.3	31.6
Barium			205	208	166	216	428	283	117	96.2	207	154	158	816
Beryllium			1.28	1.55	1.64	2.13	2.05	3.09	0.87	0.42	0.71	0.8	1.87	0.77
Cadmium			1.63	2.6	1.26	1.18	3.3	1.87	0.71 B	0.38 BJ	2.55	1	0.88 B	21.1
Calcium			51000	57800	57700	95600	60400	106000	72000	47600	34900	73600	85300	74500
Chromium			33.2	53.2	28	64.9	64.1	29.2	12.8	12.6	38	18.4	18.4	600
Hexavalent Chromium			0	0	0.385 J				0.53 U	0.55 U	0.21 J	0.15 J	0.08 J	1.39
Cobalt			5.1 J	3.9 J	5.7 J	4.3 J	4.2 J	3 J	4.1 J	5.1 J	6.6	4.1 J	3.2 BJ	6.8 J
Copper	705	595	234	302	113	117	369	149	38.8	26.1	210	130	60.2	1660
Total Cyanide			0.0011	0.0021	0.0024				2.14	0.17 J	2.08	3.26	3.12	1.21
Iron			18100	23400	33800	23200	30700	43700	12300	14900	21500	15100	17800	35500
Lead	931 E	781 E	160	287	115	97.4	438	215	126	96.8	379	169	75.4	926
Magnesium			10300	8370	11200	13400	9060	16200	9710	12100	9210	29400	9820	5500
Manganese			1020	947	921	3230	1510	2090	403	355	647	630	1080	325
Mercury			0.195	0.23	0.152	0.118	0.336	0.176	0.252	0.189	0.963	0.335	0.089	0.114
Nickel			17.9	15.2	17.4	14.1	20.9	13.3	9.8	11.7	22.7	12.7	9.5	39.2
Potassium			1840	1710	1780	1830	1590	1960	1260	1550	1130	1120	1630	1750
Selenium			0.9 J	2.2	2.2	2.3	2.2	3	1.3 U	1.3 U	1.1 J	0.9 J	1.2 J	1.5 U
Silver			0.6 J	1.2	0.4 J	0.3 J	1.6	0.5 J	0.1 J	1.3 U	0.7 J	0.3 J	0.2 J	21
Sodium			330	400	430	520	620	670	240	150	170	210	350	540
Thallium			0	0	0	0.7 J	0	0	13U	1 J	1.2 U	11U	2.2	1.3 J
Vanadium			18.1	16.5	22.2	28.8	18.8	17.9	13.3	17.8	16.7	14.1	16.2	24.1
Zinc	4230	3610	278	405	219	203	638	339	127	108	388	206	146	3300
Aroclor 1254			0	0	0	0	0	0	0.027 J	0.047 U	0.041 U	0.11	0.045 U	0.051 U
Aroclor 1260			0.026 J	0.19	0.024 J	0	0.064	0.036 J	0.035 J	0.047 U	0.041 U	0.074	0.045 U	0.051 U
gamma-BHC (Lindane)									0.011 U	0.012 U	0.01 U	0.0068 J	0.011 U	0.012 U
alpha-Chlordane			0	0.0071 J	0	0	0	0	0.011 U	0.012 U	0.01 U	0.01 U	0.011 U	0.012 U
4,4'-DDT (p,p'-DDT)			0	0.012	0	0.0093 J	0	0	0.011 U	0.012 U	0.01 U	0.01 U	0.011 U	0.012 U
4,4'-DDE (p,p'-DDE)			0.0086 J	0.0088 J	0	0.015	0	0	0.011 U	0.012 U	0.01 U	0.01 U	0.011 U	0.012 U
4,4-DDD (p,p-DDD)			0	0	0.015	0	0	0.0086 J	0.011 U	0.012 U	0.01 U	0.01 U	0.011 U	0.012 U
Dieldrin			0	0	0	0	0	0	0.011 U	0.012 U	0.01 U	0.01 U	0.011 U	0.012 U
beta-Endosulfan (II)			0	0	0	0	0	0	0.011 U	0.012 U	0.01 U	0.0084 J	0.011 U	0.012 U
Endrin			0	0	0	0	0	0	0.011 U	0.012 U	0.01 U	0.01 U	0.011 U	0.012 U
Endrin aldehyde														
Acenaphthene			0	0	0	0	0	0	0.4 U	0.38 J	0.096 J	0.39 U	0.44 U	0.51 U
Acenaphthylene			0	0	0	0	0	0	0.4 U	0.46 U	0.57	0.39 U	0.44 U	0.51 U
Anthracene			0	0.51 J	0	0	0.35 J	0	0.31 J	1.6	0.84	0.28 J	0.44 U	0.51 U
Benzo(a)anthracene			0.77 J	1.6	0.39 J	0.62 J	1.4	0.62 J	0.79	2.4	2.5	0.69	0.21 J	0.51 U
Benzo(b)fluoranthene			1 J	2.1	0.59 J	0.81 J	1.9	1.1	0.96	2.3	3.6	1	0.37 J	0.51 U
Benzo(k)fluoranthene			0	0.81 J	0.23 J	0	0.8 J	0.42 J	0.39 J	0.93	1.4	0.38 J	0.44 U	0.51 U
Benzo(g,h,i)perylene			0.61 J	0.94 J	0.27 J	0.37 J	1 J	0.58 J	0.43	0.85	1.6	0.45	0.18 J	0.51 U
Benzo(a)pyrene			0.73 J	1.4	0.38 J	0.55 J	1.3	0.66 J	0.79	1.9	2.8	0.76	0.25 J	0.51 U
Bis(2-ethylhexyl)phthalate														

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SB-077-5.0-7.0	SB-078-5.0-7.0	C-SS1-0-2	C-SS2-0-2	C-SS3-0-2	C-SS1-2-12	C-SS2-2-12	C-SS3-2-12	SB-04 (0-1)	SB-05 (0-1)	SB-06 (0-1)	SB-07 (0-1)	SB-08 (0-1)	SB-09 (0-1)
Start Depth	5	5	0	0	0	2	2	2	0	0	0	0	0	0
End Depth	7	7	2	2	2	12	12	12	1	1	1	1	1	1
Depth Unit	ft	ft	in	in	in	in	in	in	ft	ft	ft	ft	ft	ft
Sample Date	6/19/1995	6/19/1995	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/30/2017	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019
Carbazole														
Chrysene			0.76 J	1.7	0.44 J	0.64 J	1.5	0.8	0.74	2.1	2.9	0.73	0.23 J	0.51 U
Dibenz(a,h)anthracene			0	0	0	0	0	0	0.12 J	0.29 J	0.45	0.14 J	0.44 U	0.51 U
Dibenzofuran			0	0	0	0	0	0	0.4 U	0.41 J	0.21 J	0.13 J	0.44 U	0.51 U
Diethyl phthalate														
Dimethyl phthalate														
Di-n-butyl phthalate														
Fluoranthene			1.3 J	2.6	0.67 J	1.2	2.5	0.87	1.6	5.4 D	5.9 D	1.5	0.4 J	0.51 U
Fluorene			0	0	0	0	0	0	0.099 J	0.81	0.28 J	0.14 J	0.44 U	0.51 U
Indeno(1,2,3-cd)pyrene			0	0.82 J	0.24 J	0	0.88 J	0.5 J	0.47	1.1	1.9	0.52	0.19 J	0.51 U
2-Methylnaphthalene														
3,4-Methylphenol									0.4 U	0.46 U	0.098 J	0.39 U	0.44 U	0.51 U
4-Methylphenol														
Naphthalene			0	0	0	0	0	0	0.4 U	0.17 J	0.19 J	0.12 J	0.44 U	0.51 U
Phenanthrene			0.79 J	1.8	0.36 J	0.9 J	1.7	0.61 J	0.95	4.9 D	3.5	1.2	0.2 J	0.51 U
Phenol			0	0	0	0	0	0	0.4 U	0.46 U	0.39 U	0.39 U	0.44 U	0.51 U
Pyrene			1.2 J	2.2	0.59 J	1 J	2.4	0.84	1.3	4	5 D	1.2	0.34 J	0.51 U
Acetone														
Methylene chloride														
Toluene														

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SB-10 (0-1)	SB-11 (0-1)	SB-04 (1-5)	SB-05 (1-5)	SB-06 (1-5)	SB-07 (1-5)	SB-08 (1-5)	SB-09 (1-5)	SB-10 (1-5)	SB-11 (1-5)	SB-12 (0-1)	SB-13 (0-1)	SB-12 (1-5)	SB-13 (1-5)
Start Depth	0	0	1	1	1	1	1	1	1	1	0	0	1	1
End Depth	1	1	5	5	5	5	5	5	5	5	1	1	5	5
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019
Analyte														
Aluminum	19000	8800	3730	4510	11900	6480	11300	98	6160	5260	3500	2500	1750	2920
Antimony	6.9 U	6.5 U	5.9 U	6.3 U	11.4	1.3 BJ	33.2	3	6.9 U	6.5 U	6 U	6.3 U	6 U	6 U
Arsenic	3.8	2.6	2.25	5.8	20.3	7.5	6.7	0.8 U	2.5	2	1.8	2.2	9.9 U	3
Barium	187	77.5	19.7	20.7	411	155	2150	4.82 B	53.6	35.6	23.9	18.5	12.5	18.1
Beryllium	2.83	1.04	0.21 BJ	0.28 BJ	0.97	0.72	0.86	0.25 U	0.73	0.29 J	0.2 J	0.19 J	0.11 J	0.19 J
Cadmium	0.16 BJ	0.26 BJ	0.23 BJ	0.26 BJ	12.5	0.9	4.19	0.1 BJ	0.21 BJ	0.25 BJ	0.22 BJ	0.18 BJ	0.18 BJ	0.23 BJ
Calcium	144000	76600	62300	55500	40200	22300	36300	580	63200	42700	36000	17000	67700	32100
Chromium	13.9	14.4	6.11	6.8	63.7	23.5	50.1	1.84	14.1	7.3	5.7	5.1	4.27	6
Hexavalent Chromium	0.16 J	0.44 U									0.42 U	0.06 J		
Cobalt	1.9 J	2.8 J	3.3 BJ	4.7 J	4.5 J	4 J	3.5 BJ	2.5 U	3.4 J	2.8 J	2.4 J	2.1 J	1.5 J	3.4 J
Copper	17.6	17.7	14	15.8	530	78.1	1140	5.49	12.9	13	10.4	10.5	5.6	10.8
Total Cyanide	2.42	2.13									0.29 U	2.24		
Iron	15200	10400	8820	11900	51400	20700	13100	510	10500	9270	7700	6850	5110	8520
Lead	24.1	25.2	26.9	9.7	1070	238	1500	43.1	9.5	22.3	25.7	18.4	8.4	10.3
Magnesium	18100	19800	19800	7240	6400	4380	4870	53	12100	19000	14700	3850	35300	5400
Manganese	2210	1240	258	385	772	408	424	5.4	600	311	248	179	155	232
Mercury	0.04	0.046	0.04	0.022 J	1.04	0.375	0.155	0.184	0.018 J	0.087	0.034	0.022 J	0.022 J	0.018 J
Nickel	5.5	4.6	9.4	14.2	40.8	14.6	30.5	2 U	9.4	4 J	5.3	4.9	2.1 J	9
Potassium	1450	1080	700	820	870	890	550	13.8 BJ	980	990	790	570	630	770
Selenium	12 U	0.9 J	1 U	1.1 U	11 U	0.8 J	1.1 U	1 U	1.1 U	1.1 U	1 U	1.1 U	1 U	1 U
Silver	1.2 U	1.1 U	0.98 U	1.1 U	1.5	0.3 J	0.9 J	0.5 U	1.1 U	1.1 U	1 U	1.1 U	0.99 U	1 U
Sodium	540	240	110	100 J	270	220	150	100 U	200	120	100 J	70 J	104	80 J
Thallium	4.2	2	1.4	1 J	1.1 U	1.2 U	1.1 U	1 U	1.5	0.8 J	10 U	1.1 U	2.65	1 U
Vanadium	12.3	16	8.2	10.8	16.1	17.5	13	2.5 U	11.2	12.7	9.7	6.8	6	9.3
Zinc	51.7	69.4	40.2	45.6	3330	271	1160	12.2	45.6	59.6	50.9	36.9	37.6	38.9
Aroclor 1254	0.037 U	0.036 U	0.035 U	0.034 U	0.1	0.28	0.037 U	0.045 U	0.04 U	0.037 U	0.033 U	0.034 U	0.036 U	0.032 U
Aroclor 1260	0.037 U	0.036 U	0.035 U	0.034 U	0.058	0.11	0.037 U	0.045 U	0.04 U	0.037 U	0.033 U	0.034 U	0.036 U	0.032 U
gamma-BHC (Lindane)	0.019 U	0.0093 U									0.0085 U	0.0087 U		
alpha-Chlordane	0.019 U	0.0093 U									0.0085 U	0.0087 U		
4,4'-DDT (p,p'-DDT)	0.019 U	0.0093 U									0.0085 U	0.0087 U		
4,4'-DDE (p,p'-DDE)	0.019 U	0.0093 U									0.0085 U	0.0087 U		
4,4-DDD (p,p-DDD)	0.019 U	0.0093 U									0.0085 U	0.0087 U		
Dieldrin	0.019 U	0.0093 U									0.0085 U	0.0087 U		
beta-Endosulfan (II)	0.019 U	0.0093 U									0.0085 U	0.0087 U		
Endrin	0.019 U	0.0093 U									0.0085 U	0.0087 U		
Endrin aldehyde														
Acenaphthene	0.4 U	0.37 U	0.12 J	0.36 U	0.15 J	0.4 U	0.41 U	0.15 J	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Acenaphthylene	0.4 U	0.37 U	0.35 U	0.36 U	0.33 J	0.4 U	0.41 U	0.45 U	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Anthracene	0.4 U	0.37 U	0.34 J	0.36 U	0.75	0.24 J	0.41 U	0.27 J	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Benzo(a)anthracene	0.43	0.21 J	0.52	0.36 U	2	0.74	1	0.7	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Benzo(b)fluoranthene	0.44	0.26 J	0.59	0.36 U	3.1	1.2	1.7	0.93	0.4 U	0.13 J	0.35 U	0.35 U	0.35 U	0.37 U
Benzo(k)fluoranthene	0.18 J	0.37 U	0.23 J	0.36 U	1	0.42	0.6	0.3 J	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Benzo(g,h,i)perylene	0.17 J	0.13 J	0.25 J	0.36 U	1.4	0.58	0.87	0.53	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Benzo(a)pyrene	0.34 J	0.2 J	0.47	0.36 U	2.2	0.84	1.4	0.85	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Bis(2-ethylhexyl)phthalate														



Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SB-10 (0-1)	SB-11 (0-1)	SB-04 (1-5)	SB-05 (1-5)	SB-06 (1-5)	SB-07 (1-5)	SB-08 (1-5)	SB-09 (1-5)	SB-10 (1-5)	SB-11 (1-5)	SB-12 (0-1)	SB-13 (0-1)	SB-12 (1-5)	SB-13 (1-5)
Start Depth	0	0	1	1	1	1	1	1	1	1	0	0	1	1
End Depth	1	1	5	5	5	5	5	5	5	5	1	1	5	5
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019
Carbazole														
Chrysene	0.42	0.2 J	0.51	0.36 U	2.1	0.79	1.1	0.77	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Dibenz(a,h)anthracene	0.4 U	0.37 U	0.35 U	0.36 U	0.38 J	0.16 J	0.26 J	0.16 J	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Dibenzofuran	0.4 U	0.37 U	0.13 J	0.36 U	0.22 J	0.1 J	0.41 U	0.092 J	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Diethyl phthalate														
Dimethyl phthalate														
Di-n-butyl phthalate														
Fluoranthene	0.94	0.35 J	1.2	0.36 U	3.9	1.3	0.91	1.4	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Fluorene	0.4 U	0.37 U	0.23 J	0.36 U	0.3 J	0.4 U	0.41 U	0.12 J	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Indeno(1,2,3-cd)pyrene	0.21 J	0.14 J	0.3 J	0.36 U	1.6	0.64	1.1	0.46	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
2-Methylnaphthalene														
3,4-Methylphenol	0.4 U	0.37 U	0.35 U	0.36 U	0.39 U	0.4 U	0.41 U	0.21 J	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
4-Methylphenol														
Naphthalene	0.4 U	0.37 U	0.11 J	0.36 U	0.32 J	0.14 J	0.41 U	0.45 U	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Phenanthrene	0.21 J	0.22 J	1.1	0.36 U	2.6	0.8	0.36 J	0.95	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Phenol	0.4 U	0.37 U	0.35 U	0.36 U	0.39 U	0.4 U	0.41 U	0.45 U	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Pyrene	0.87	0.37 J	0.91	0.36 U	3.4	1.1	0.82	1.2	0.4 U	0.39 U	0.35 U	0.35 U	0.35 U	0.37 U
Acetone														
Methylene chloride														
Toluene														

Footnotes:

(1) Calcium, iron, magnesium, potassium and sodium excluded as COCs.

General Notes:

1. Units are milligrams per kilogram (mg/kg); refer to original reports for data qualifier codes.
2. Only analytes detected in soil are presented here.
3. Analytes included as COPCs if maximum detected concentration exceeds residential soil standards.
4. Several analytes evaluated as COPCs for other AOCs were included as COPCs even though concentrations do not exceed residential soil standards.

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name Start Depth End Depth Depth Unit Sample Date	Chemical of Potential Concern	Maximum Detected	NYSDEC / USEPA Residential Soil Standard
Analyte			
Aluminum	X	22900	7,700
Antimony	X	37	3.1
Arsenic	X	31.6	16
Barium	X	2150	350
Beryllium		3.2	14
Cadmium	X	21.1	2.5
Calcium	(1)	144000	
Chromium	X	600	36
Hexavalent Chromium		1.39	22
Cobalt	X	43.8	2.3
Copper	X	1660	270
Total Cyanide		3.26	27
Iron	(1)	51400	
Lead	X	5530	400
Magnesium	(1)	60400	
Manganese	X	3350	2,000
Mercury	X	2	0.81
Nickel		48.1	140
Potassium	(1)	1960	
Selenium		12	36
Silver		21	36
Sodium	(1)	818	
Thallium	X	4.2	0.078
Vanadium		30.9	39
Zinc	X	4230	2,200
Aroclor 1254		0.28	1
Aroclor 1260		0.19	1
gamma-BHC (Lindane)		0.007	0.28
alpha-Chlordane		0.007	0.91
4,4'-DDT (p,p'-DDT)		0.054	1.7
4,4'-DDE (p,p'-DDE)		0.019	1.8
4,4-DDD (p,p-DDD)		0.02	2.6
Dieldrin		0.019	0.039
beta-Endosulfan (II)		0.019	4.8
Endrin		0.019	2.2
Endrin aldehyde		0.017	1.9
Acenaphthene		0.63	100
Acenaphthylene		0.57	100
Anthracene		1.6	100
Benzo(a)anthracene	X	3.3	1
Benzo(b)fluoranthene	X	3.6	1
Benzo(k)fluoranthene	X	2.5	1
Benzo(g,h,i)perylene		1.6	100
Benzo(a)pyrene	X	3.2	1
Bis(2-ethylhexyl)phthalate		4.5	39

Table A-3. Soil Data Table and Chemicals of Potential Concern for Area C - South and East of Cottonwood Copse AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name Start Depth End Depth Depth Unit Sample Date	Chemical of Potential Concern	Maximum Detected	NYSDEC / USEPA Residential Soil Standard
Carbazole		0.29	24
Chrysene	X	3.9	1
Dibenz(a,h)anthracene	X	0.51	0.33
Dibenzofuran		0.51	14
Diethyl phthalate		0.21	5,000
Dimethyl phthalate		0.042	5,000
Di-n-butyl phthalate		0.4	630
Fluoranthene		6.4	100
Fluorene		0.81	100
Indeno(1,2,3-cd)pyrene	X	1.9	0.5
2-Methylnaphthalene		0.26	24
3,4-Methylphenol		0.51	34
4-Methylphenol		0.064	34
Naphthalene		0.51	100
Phenanthrene		5.3	100
Phenol		0.51	100
Pyrene		6.9	100
Acetone		1.3	100
Methylene chloride		0.009	51
Toluene		0.024	100

## ***Appendix A-4 Bell Slip AOC***

Table A-4. Soil Data Table and Chemicals of Potential Concern for Bell Slip AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	SS-66Z	SS-67	SS-67Z	SS-71Z	SS-72Z	SB-039-0.0-8.0	C-SS1-0-2	C-SS2-0-2	C-SS3-0-2	C-SS1-2-12	C-SS2-2-12	C-SS3-2-12	D-SB7-1-6
Start Depth	0	0	0	0	0	0	0	0	0	2	2	2	1
End Depth	1	1	1	1	1	8	2	2	2	12	12	12	6
Depth Unit	ft	ft	ft	ft	ft	ft	in	in	in	in	in	in	ft
Sample Date	8/29/1994	8/29/1994	8/29/1994	8/30/1994	8/30/1994	9/2/1994	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/21/2017
Analyte													
Aluminum				22900	8370	16200 E	14000	13200	16100	19000	17000	22700	17600
Antimony							0	1.9 J	0	0	2.1 J	1.2 J	1.4 J
Arsenic					6.3	13 E	7.8	10	9.2	7.4	14.6	11.2	18.4
Barium				286	117 E	180	205	208	166	216	428	283	381
Beryllium				3.2		2.3	1.28	1.55	1.64	2.13	2.05	3.09	2.75
Cadmium				2.5 E	0.72 BE	0.93 BE	1.63	2.6	1.26	1.18	3.3	1.87	1.18
Calcium				124000	52900	102000	51000	57800	57700	95600	60400	106000	93900
Chromium				61.5	28.9	17.3	33.2	53.2	28	64.9	64.1	29.2	17.9
Hexavalent Chromium							0	0	0.385 J				
Cobalt					5.6 B		5.1 J	3.9 J	5.7 J	4.3 J	4.2 J	3 J	3 J
Copper				187	125	28.1 E	234	302	113	117	369	149	155
Total Cyanide					1.3 R		0.0011	0.0021	0.0024				
Iron				9670	27200	13300 E	18100	23400	33800	23200	30700	43700	25700
Lead				268	95.2	125	160	287	115	97.4	438	215	452
Magnesium				16200	8080	13200	10300	8370	11200	13400	9060	16200	10900
Manganese				3350	702	1200 E	1020	947	921	3230	1510	2090	1960
Mercury				0.18	0.75	0.28	0.195	0.23	0.152	0.118	0.336	0.176	0.356
Nickel				11.6	20.4	11.1 E	17.9	15.2	17.4	14.1	20.9	13.3	12.4
Potassium				1680	882 B	1760	1840	1710	1780	1830	1590	1960	1300
Selenium				1.5		1.9 E	0.9 J	2.2	2.2	2.3	2.2	3	3.6
Silver							0.6 J	1.2	0.4 J	0.3 J	1.6	0.5 J	0.4 J
Sodium				818 B			330	400	430	520	620	670	640
Thallium							0	0	0	0.7 J	0	0	0
Vanadium				10.2 B	18.8	19.6	18.1	16.5	22.2	28.8	18.8	17.9	16.4
Zinc				384	219	224	278	405	219	203	638	339	179
Aroclor 1254							0	0	0	0	0	0	0
Aroclor 1260	0.027 JP			0.037 JP			0.026 J	0.19	0.024 J	0	0.064	0.036 J	0
gamma-BHC													
alpha-Chlordane							0	0.0071 J	0	0	0	0	0
4,4'-DDT (p,p'-DDT)					0.0041 P		0	0.012	0	0.0093 J	0	0	54
4,4'-DDE (p,p'-DDE)							0.0086 J	0.0088 J	0	0.015	0	0	0
4,4-DDD (p,p-DDD)							0	0	0.015	0	0	0.0086 J	18
Dieldrin							0	0	0	0	0	0	0
beta-Endosulfan (II)							0	0	0	0	0	0	0
Endrin							0	0	0	0	0	0	10
Endrin aldehyde						0.015 P							
Lindane							0	0	0	0	0	0	0
Acenaphthene		0.26 J					0	0	0	0	0	0	0.12 J
Acenaphthylene				0.041 J			0	0	0	0	0	0	0.2 J
Anthracene			0.6 J	0.057 J			0	0.51 J	0	0	0.35 J	0	0.47
Benzo(a)anthracene	0.2 J		1.4	0.33 J	0.057 J		0.77 J	1.6	0.39 J	0.62 J	1.4	0.62 J	1.6
Benzo(b)fluoranthene	0.33 J		1.5	0.51	0.069 J		1 J	2.1	0.59 J	0.81 J	1.9	1.1	2.1
Benzo(k)fluoranthene	0.37 J		1.6	0.38 J	0.054 J		0	0.81 J	0.23 J	0	0.8 J	0.42 J	0.66
Benzo(g,h,i)perylene			0.2 J	0.17 J			0.61 J	0.94 J	0.27 J	0.37 J	1 J	0.58 J	0.74
Benzo(a)pyrene	0.21 J		1.2	0.35 J	0.053 J		0.73 J	1.4	0.38 J	0.55 J	1.3	0.66 J	1.6

Table A-4. Soil Data Table and Chemicals of Potential Concern for Bell Slip AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	SS-66Z	SS-67	SS-67Z	SS-71Z	SS-72Z	SB-039-0.0-8.0	C-SS1-0-2	C-SS2-0-2	C-SS3-0-2	C-SS1-2-12	C-SS2-2-12	C-SS3-2-12	D-SB7-1-6
Start Depth	0	0	0	0	0	0	0	0	0	2	2	2	1
End Depth	1	1	1	1	1	8	2	2	2	12	12	12	6
Depth Unit	ft	ft	ft	ft	ft	ft	in	in	in	in	in	in	ft
Sample Date	8/29/1994	8/29/1994	8/29/1994	8/30/1994	8/30/1994	9/2/1994	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/30/2017	8/21/2017
Bis(2-ethylhexyl)phthalate	0.1		0.48 J	0.58									
Carbazole			0.19 J										
Chrysene	0.26 J		1.4	0.44	0.062 J		0.76 J	1.7	0.44 J	0.64 J	1.5	0.8	1.9
Dibenz(a,h)anthracene				0.085 J			0	0	0	0	0	0	0.22 J
Dibenzofuran			0.28 J				0	0	0	0	0	0	0.13 J
Diethyl phthalate				0.21 J	0.075 J								
Dimethyl phthalate				0.042 J									
Fluoranthene	0.49 J		2.7	0.75	0.11 J		1.3 J	2.6	0.67 J	1.2	2.5	0.87	3.5
Fluorene			0.42 J				0	0	0	0	0	0	0.22 J
Indeno(1,2,3-cd)pyrene			0.36 J	0.22 J	0.041 J		0	0.82 J	0.24 J	0	0.88 J	0.5 J	0.87
2-Methylnaphthalene		0.17 J		0.052 J									
3,4-Methylphenol													0
Naphthalene		0.15 J		0.044 J			0	0	0	0	0	0	0.17 J
Phenanthrene	0.3 J		2.6	0.41	0.07 J		0.79 J	1.8	0.36 J	0.9 J	1.7	0.61 J	1.9
Phenol							0	0	0	0	0	0	0
Pyrene	0.41 J		2.3	0.64	0.01 J		1.2 J	2.2	0.59 J	1 J	2.4	0.84	3.3
Acetone													0.059
Benzene													0.0008 J
n-Butylbenzene													0
sec-Butylbenzene													0.0079
tert-Butylbenzene													0.003
1,4-Dichlorobenzene													0.0019 J
cis-1,2-Dichloroethene													0
Ethylbenzene													0
Methyl ethyl ketone													0.016
Methylene chloride													0
n-Propylbenzene													0
Tetrachloroethene (PCE)													0
Toluene													0.0015 J
1,2,4-Trimethylbenzene													0.0029 J
1,3,5-Trimethylbenzene													0.001 J
Vinyl chloride													0
Total Xylene													0

Table A-4. Soil Data Table and Chemicals of Potential Concern for Bell Slip AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB16-1-6	D-SB30-1-8	D-SB31-1-8	D-SB32-1-8	D-SB33-1-8	D-SB34-1-8	D-SB35-1-8	D-SB36-1-8	D-SB37-1-8	D-SB32-2-3	D-SB34-3-4	D-SB31-3.5-4.5	D-SB32-4-5
Start Depth	1	1	1	1	1	1	1	1	1	2	3	3.5	4
End Depth	6	8	8	8	8	8	8	8	8	3	4	4.5	5
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/23/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017
Analyte													
Aluminum	5420	6250	8550	11300	7020	5410	6750	5030	7100				
Antimony	0	0	2.2 J	7.1 J	2.5 J	5.6 J	2 J	3.2 J	8.8				
Arsenic	6.2	19.3	15	19.4	18.7	15.8	32.7	22.2	27.1				
Barium	81.9	302	222	592	926	158	230	288	225				
Beryllium	0.42	0.86	1.21	0.77	0.64	0.82	0.91	0.7	0.7				
Cadmium	0.83	0.33 J	1.8	15.4	1.5	0.86	14.2	2.29	1.61				
Calcium	47200	44100	42400	69200	34300	5540	16200	4070	11600				
Chromium	22.5	13.6	38.7	489	215	16.3	55.9	40.4	101				
Hexavalent Chromium													
Cobalt	3.5 J	4.3 J	4.1 J	6.7 J	5.5 J	4.4 J	5.4 J	6.6	7.9				
Copper	68.3	99.2	153	1130	193	46.7	180	517	467				
Total Cyanide													
Iron	13200	28300	21400	38400	17600	19600	30100	32900	24400				
Lead	96.6	758	614	472	9780	296	186	729	1510				
Magnesium	14500	6420	5900	5240	4130	630	2280	620	4010				
Manganese	424	339	728	889	286	157	173	156	345				
Mercury	0.093	0.745	0.173	0.369	0.556	0.103	0.243	0.268	0.122				
Nickel	10	15.1	16.5	42.3	20.4	13.2	20.3	38.6	30.1				
Potassium	770	580	910	1680	700	480	680	360	490				
Selenium	0.7 J	1 J	2.1	2.5	2.5	1.3	2.5	2.5	2.1				
Silver	0.4 J	0.5 J	1.9	50.2	0.9 J	0.2 J	2.1	5.6	1 J				
Sodium	260	450	520	890	420	310	370	380	210				
Thallium	0	0	0	3	0	0	0	0	0				
Vanadium	11.5	15.3	15.1	27.4	17.5	20.5	24.6	26.9	40.2				
Zinc	220	205	335	2190	727	186	375	550	466				
Aroclor 1254	0	0	0	0	0	0	0	0	0				
Aroclor 1260	0	0	0	0	0	0	0	0	0.033 J				
gamma-BHC													
alpha-Chlordane	0	0	0	0	0	0	0	0	0				
4,4'-DDT (p,p'-DDT)	0	0	0	0	0.011 J	0	0	0	0				
4,4'-DDE (p,p'-DDE)	0	0	0	0	0	0	0	0	0				
4,4-DDD (p,p-DDD)	0	0	0	0	0.0092 J	0	0	0	0				
Dieldrin	0	0	0	0	0	0	0	0	0				
beta-Endosulfan (II)	0	0	0	0	0	0	0	0	0				
Endrin	0	0	0	0	0	0	0	0	0				
Endrin aldehyde													
Lindane	0	0	0	0	0	0.019	0	0	0.0076 J				
Acenaphthene	0	0	0.2 J	0	11	1.2 J	0	0.1 J	0.25 J				
Acenaphthylene	0	0	0.17 J	0	1.7 J	0	0	0	0.5 J				
Anthracene	0.25 J	0.11 J	0.74	0	32	3.7	0.19 J	0.21 J	1.4				
Benzo(a)anthracene	0.75	0.28 J	1.7	0.14 J	39	5	0.41 J	0.41 J	4.3				
Benzo(b)fluoranthene	0.87	0.24 J	2.1	0.2 J	34	5.3	0.48	0.42	4.9				
Benzo(k)fluoranthene	0.29 J	0	0.8	0	14	1.8	0.18 J	0.18 J	1.9				
Benzo(g,h,i)perylene	0.45 J	0	0.93	0	16	2.7	0.25 J	0.22 J	2.7				
Benzo(a)pyrene	0.68 J	0.19 J	1.5	0.15 J	31	4.1	0.32 J	0.33 J	4.4				

Table A-4. Soil Data Table and Chemicals of Potential Concern for Bell Slip AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB16-1-6	D-SB30-1-8	D-SB31-1-8	D-SB32-1-8	D-SB33-1-8	D-SB34-1-8	D-SB35-1-8	D-SB36-1-8	D-SB37-1-8	D-SB32-2-3	D-SB34-3-4	D-SB31-3.5-4.5	D-SB32-4-5
Start Depth	1	1	1	1	1	1	1	1	1	2	3	3.5	4
End Depth	6	8	8	8	8	8	8	8	8	3	4	4.5	5
Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/23/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017
Bis(2-ethylhexyl)phthalate													
Carbazole													
Chrysene	0.73	0.22 J	1.8	0.16 J	34	4.6	0.45	0.38 J	3.6				
Dibenz(a,h)anthracene	0	0	0.22 J	0	4.8 J	0.71 J	0	0	0.73 J				
Dibenzofuran	0	0	0.2 J	0	13	1.3	0	0	0.34 J				
Diethyl phthalate													
Dimethyl phthalate													
Fluoranthene	1.3	0.52	4.1	0.27 J	91	12	1	0.88	7.9				
Fluorene	0	0	0.38 J	0	24	2	0	0.11 J	0.54 J				
Indeno(1,2,3-cd)pyrene	0.38 J	0	0.94	0	18	2.9	0.25 J	0.23 J	3.2				
2-Methylnaphthalene													
3,4-Methylphenol	0	0.2 J	0.37 J	0.12 J	0	0	0	0	0				
Naphthalene	0	0	0.25 J	0	13	0.54 J	0.097 J	0.11 J	0.24 J				
Phenanthrene	1.1	0.36 J	2.9	0.22 J	110	11	0.76	0.94	4.9				
Phenol	0	0	0	0	0	0	2.6	0	0				
Pyrene	1.3	0.46	3.6	0.27 J	72	9.6	0.85	0.71	6.3				
Acetone										0.091	0.17	0.056	0.69
Benzene										0.0007 J	0.001 J	0	0
n-Butylbenzene										0.015	0.0057 J	0	0
sec-Butylbenzene										0.035	0.0037 J	0.0047 J	0.038
tert-Butylbenzene										0.0059 J	0.0008 J	0.0074	0.0096 J
1,4-Dichlorobenzene										0	0	0	0
cis-1,2-Dichloroethene										0	0	0.0036 J	0
Ethylbenzene										0.0005 J	0.0005 J	0	0
Methyl ethyl ketone										0.018	0.034	0.0089	0.2
Methylene chloride										0	0	0.0017 J	0.0028 J
n-Propylbenzene										0.012	0.0011 J	0	0
Tetrachloroethene (PCE)										0.0074	0.0019 J	0.044	0.02 J
Toluene										0	0	0	0
1,2,4-Trimethylbenzene										0.0052 J	0.014	0.0037 J	0.01 J
1,3,5-Trimethylbenzene										0.0011 J	0.0061	0.0019 J	0
Vinyl chloride										0	0.0035 J	0	0
Total Xylene										0.0008 J	0.0038 J	0.0008 J	0



Table A-4. Soil Data Table and Chemicals of Potential Concern for Bell Slip AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
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Sample Name	D-SB33-4.5-5.5	D-SB16-0-1	D-SS2-0-2	D-SS3-0-2	D-SB7-0-1	D-SB30-0-1	D-SB31-0-1	D-SB32-0-1	D-SB33-0-1	D-SB34-0-1	D-SB35-0-1	D-SB36-0-1	D-SB37-0-1
Start Depth	4.5	0	0	0	0	0	0	0	0	0	0	0	0
End Depth	5.5	1	2	2	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	in	in	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/25/2017	8/23/2016	8/16/2017	8/16/2017	8/21/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017
Analyte													
Aluminum		9730	20800	12900	10700	4130	10100	13100	5900	21300	21800	3670	60500
Antimony		0	0	3.3 J	0	0	0	1.5 J	0	0	5.9 J	2.9 J	5.1 J
Arsenic		13.3	10.1	19	17.3	10.3	6.8	7.5	15	8	18.3	3.5	12.8
Barium		139	427	356	171	222	147	265	371	279	879	36	287
Beryllium		1.07	3.07	1.15	1.44	0.38	1.49	1.78	0.77	3.02	2.14	0.47	3.07
Cadmium		2.97	0.66	3.46	1.3	0.3 J	1.36	3.33	1.47	2.21	24	1.01	2.36
Calcium		39000	94800	23200	111000	68400	172000	129000	47500	102000	86200	12600	82800
Chromium		30.4	18	58.6	33.9	8.1	44.3	104	56.4	59	637	10.2	51.9
Hexavalent Chromium		0.06 J	0.05 J	0.19 J	0	0	0	0	0	0	0.38 J	0.09 J	0.21 J
Cobalt		4.9 J	2.4 J	5.5 J	5.1 J	3 J	2.1 J	1.9 J	4 J	2.3 J	7	1.6 J	3.5 J
Copper		158	42.3	348	77.3	36.4	122	265	449	153	1520	279	2740
Total Cyanide		2.72	8.83	0.94	0.44	0.2	0.46	0.38	0.18	0.707	1.14	0.11	0
Iron		59200	26900	25300	18900	11400	13000	13600	15500	24100	32500	6180	14000
Lead		267	115	451	198	117	113	317	1020	224	754	64.4	378
Magnesium		7150	9880	5090	9460	4100	11500	13600	4160	13000	11200	3140	15700
Manganese		1590	1520	553	989	105	823	1010	481	2140	932	253	2610
Mercury		0.578	0.147	1.01	0.28	0.046	0.074	0.122	0.716	0.185	0.138	0.255	0.232
Nickel		18.2	8.6	35.9	16.3	12.9	10.8	13.8	25.6	11.2	46.4	5.8	28.9
Potassium		1080	2620	1300	3080	680	930	1200	630	1860	1860	400	1390
Selenium		2	2.2	2.3	1.53	0.7 J	1.5	2.2	1.9	3.2	2.1	0.8 J	2.7
Silver		0.4 J	0.1 J	2.1	0.5 J	1.5	0.6 J	2.6	0.6 J	1.3	16.6	0.1 J	0.7 J
Sodium		370	540	430	360	270	440	610	410	720	760	130	730
Thallium		0	0	0	2.5	0.8 J	4.1	2.4	0	0	0.8 J	0	0
Vanadium		23	15.8	21.6	26.1	16.7	12.2	14.4	12.7	13.3	26.8	7.3	17.7
Zinc		514	149	730	263	178	244	557	480	325	4730	540	896
Aroclor 1254		0	0	0	0	0	0	0	0	0	0	0	0
Aroclor 1260		0.023 J	0.13	0.12	0.044	0	0	0	0	0	0	0	0.042
gamma-BHC													
alpha-Chlordane		0	0	0	0	0	0	0	0	0	0	0	0.0093 J
4,4'-DDT (p,p'-DDT)		0	0	0.011	0	0	0	0	0	0	0	0	0
4,4'-DDE (p,p'-DDE)		0	0	0	0	0	0	0	0	0	0	0	0
4,4-DDD (p,p-DDD)		0	0	0	0	0	0	0	0	0	0	0	0
Dieldrin		0	0	0	0	0	0	0	0	0	0	0	0
beta-Endosulfan (II)													
Endrin		0	0	0	0	0	0	0	0	0	0	0	0
Endrin aldehyde													
Lindane		0	0	0	0	0	0	0	0	0	0.0078 J	0.0053 J	0.016
Acenaphthene		0	0	0	0	0	0	0	0.48 J	0	0.75 J	0.38	1.4
Acenaphthylene		0.26 J	0.13 J	0	0.12 J	0	0	0	0.21 J	0	0	0	0
Anthracene		0.66 J	0.14 J	0.19 J	0.22 J	0	0	0	2.5	0.19 J	1.8	0.55	2.3
Benzo(a)anthracene		2.8	0.52	0.72	0.69	0	0.62 J	0.57 J	3.6	1.5	4.5	1.1	4.1
Benzo(b)fluoranthene		4.9	0.76	0.92	0.87	0	0.84 J	0.87 J	3.8	2.4	5	1.3	4.3
Benzo(k)fluoranthene		1.4	0.25 J	0.31 J	0.31 J	0	0	0	1.5	0.82	1.9	0.46	1.6
Benzo(g,h,i)perylene		2.5	0.38 J	0.43	0.35 J	0	0.42 J	0.59 J	1.9	1	2.5	0.52	2.1
Benzo(a)pyrene		2.9	0.55	0.72	0.7	0	0.58 J	0.62 J	3.3	1.3	4.1	0.97	3.5

Table A-4. Soil Data Table and Chemicals of Potential Concern for Bell Slip AOC  
 Human Health Risk Characterization  
 Buffalo Outer Harbor  
 Buffalo, New York

Sample Name	D-SB33-4.5-5.5	D-SB16-0-1	D-SS2-0-2	D-SS3-0-2	D-SB7-0-1	D-SB30-0-1	D-SB31-0-1	D-SB32-0-1	D-SB33-0-1	D-SB34-0-1	D-SB35-0-1	D-SB36-0-1	D-SB37-0-1
Start Depth	4.5	0	0	0	0	0	0	0	0	0	0	0	0
End Depth	5.5	1	2	2	1	1	1	1	1	1	1	1	1
Depth Unit	ft	ft	in	in	ft	ft	ft	ft	ft	ft	ft	ft	ft
Sample Date	8/25/2017	8/23/2016	8/16/2017	8/16/2017	8/21/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017	8/25/2017
Bis(2-ethylhexyl)phthalate													
Carbazole													
Chrysene		3	0.55	0.71	0.65	0	0.72 J	0.64 J	3.4	1.9	4.3	1.1	4
Dibenz(a,h)anthracene		0.69 J	0.1 J	0.12 J	0.094 J	0	0	0	0.48 J	0.31 J	0.72 J	0.16 J	0.62 J
Dibenzofuran		0.33 J	0	0	0	0	0	0	0.43 J	0	0.46 J	0.24 J	0.82
Diethyl phthalate													
Dimethyl phthalate													
Fluoranthene		4.2	1	1.4	1.4	0	1.3 J	0.96 J	7.6	2	9.1	2.6	9.1
Fluorene		0.24 J	0	0	0	0	0	0	1	0	0.79 J	0.38	1.4
Indeno(1,2,3-cd)pyrene		2.1	0.45	0.52	0.44	0	0.42 J	0.51 J	2.2	1.1	2.9	0.61	2.4
2-Methylnaphthalene													
3,4-Methylphenol		0	0	0	0	0	0	0	0	0	0	0	0
Naphthalene		0.58 J	0	0.094 J	0	0	0	0	0.27 J	0	0.2 J	0.15 J	0.37 J
Phenanthrene		2.8	0.48	0.74	0.65	0	0.87 J	0.73 J	5.9	0.83	6.5	2.5	8.6
Phenol		0	0	0	0	0	0	0	0	0	0	0	0
Pyrene		3.8	0.81	1.1	1.2	0	1.1 J	0.95 J	6.5	1.7	7.5	1.9	6.9
Acetone	0.085												
Benzene	0												
n-Butylbenzene	0.0013 J												
sec-Butylbenzene	0.0016 J												
tert-Butylbenzene	0.0046 J												
1,4-Dichlorobenzene	0												
cis-1,2-Dichloroethene	0												
Ethylbenzene	0												
Methyl ethyl ketone	0.017												
Methylene chloride	0												
n-Propylbenzene	0												
Tetrachloroethene (PCE)	0.0065												
Toluene	0												
1,2,4-Trimethylbenzene	0.0045 J												
1,3,5-Trimethylbenzene	0.001 J												
Vinyl chloride	0												
Total Xylene	0												

Table A-4. Soil Data Table and Chemicals of Potential Concern for Bell Slip AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SS2-2-12	D-SS3-2-12	SB-07 (0-1)	SB-08 (0-1)	SB-09 (0-1)	SB-07 (1-5)	SB-08 (1-5)	SB-09 (1-5)	Chemical of Potential Concern	Maximum Detected	NYSDEC / USEPA Residential Soil Standard
Start Depth	2	2	0	0	0	1	1	1			
End Depth	12	12	1	1	1	5	5	5			
Depth Unit	in	in	ft	ft	ft	ft	ft	ft			
Sample Date	8/16/2017	8/16/2017	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019			
Analyte											
Aluminum	6170	10700	10100	15600	12800	6480	11300	98	X	60500	7,700
Antimony	0	4.1 J	6.8 U	7.6 U	6.1 BJ	1.3 BJ	33.2	3 U	X	33.2	3.1
Arsenic	19.5	17	5.5	6.3	31.6	7.5	6.7	0.8 U	X	32.7	16
Barium	152	357	154	158	816	155	2150	4.82 B	X	2150	350
Beryllium	0.88	0.91	0.8	1.87	0.77	0.72	0.86	0.25 U		3.2	14
Cadmium	0.61	3.38	1	0.88 B	21.1	0.9	4.19	0.1 BJ	X	24	2.5
Calcium	5890	26800	73600	85300	74500	22300	36300	580	(1)	172000	
Chromium	17.2	85.3	18.4	18.4	600	23.5	50.1	1.84	X	637	36
Hexavalent Chromium			0.15 J	0.08 J	1.39					1.39	22
Cobalt	5.6	5.9	4.1 J	3.2 BJ	6.8 J	4 J	3.5 BJ	2.5 U	X	7.9	2.3
Copper	102	377	130	60.2	1660	78.1	1140	5.49	X	2740	270
Total Cyanide			3.26	3.12	1.21					8.83	27
Iron	13900	22600	15100	17800	35500	20700	13100	510	(1)	59200	
Lead	760	515	169	75.4	926	238	1500	43.1	X	9780	400
Magnesium	900	6570	29400	9820	5500	4380	4870	53	(1)	29400	
Manganese	141	454	630	1080	325	408	424	5.4	X	3350	2,000
Mercury	0.107	0.839	0.335	0.089	0.114	0.375	0.155	0.184	X	1.01	0.81
Nickel	15.1	34.8	12.7	9.5	39.2	14.6	30.5	2 U		46.4	140
Potassium	720	1190	1120	1630	1750	890	550	13.8 BJ	(1)	3080	
Selenium	2.3	1.5	0.9 J	1.2 J	1.5 U	0.8 J	1.1 U	1 U		3.6	36
Silver	10.7	2.9	0.3 J	0.2 J	21	0.3 J	0.9 J	0.5 U	X	50.2	36
Sodium	200	330	210	350	540	220	150	100 U	(1)	890	
Thallium	0	0	11U	2.2	1.3 J	1.2 U	1.1 U	1 U	X	4.1	0.078
Vanadium	28.6	22.6	14.1	16.2	24.1	17.5	13	2.5 U	X	40.2	39
Zinc	140	764	206	146	3300	271	1160	12.2	X	4730	2,200
Aroclor 1254	0	0.44	0.11	0.045 U	0.051 U	0.28	0.037 U	0.045 U	X	0.44	1
Aroclor 1260	0.095	0.42	0.074	0.045 U	0.051 U	0.11	0.037 U	0.045 U	X	0.42	1
gamma-BHC			0.0068 J	0.011 U	0.012 U					0.012	0.28
alpha-Chlordane	0	0	0.01 U	0.011 U	0.012 U					0.012	0.91
4,4'-DDT (p,p'-DDT)	0.0053 JP	0.06	0.01 U	0.011 U	0.012 U				X	54	1.7
4,4'-DDE (p,p'-DDE)	0	0.0083 J	0.01 U	0.011 U	0.012 U					0.015	1.8
4,4-DDD (p,p-DDD)	0	0	0.01 U	0.011 U	0.012 U				X	18	2.6
Dieldrin	0	0.029 P	0.01 U	0.011 U	0.012 U					0.029	0.039
beta-Endosulfan (II)			0.0084 J	0.011 U	0.012 U					0.012	4.8
Endrin	0.0081 J	0.028	0.01 U	0.011 U	0.012 U				X	10	2.2
Endrin aldehyde										0.015	1.9
Lindane	0	0								0.019	0.57
Acenaphthene	0	0	0.39 U	0.44 U	0.51 U	0.4 U	0.41 U	0.15 J		11	100
Acenaphthylene	0	0	0.39 U	0.44 U	0.51 U	0.4 U	0.41 U	0.45 U		1.7	100
Anthracene	0	0.41 J	0.28 J	0.44 U	0.51 U	0.24 J	0.41 U	0.27 J		32	100
Benzo(a)anthracene	0	1.4 J	0.69	0.21 J	0.51 U	0.74	1	0.7	X	39	1
Benzo(b)fluoranthene	0	1.6 J	1	0.37 J	0.51 U	1.2	1.7	0.93	X	34	1
Benzo(k)fluoranthene	0	0.55 J	0.38 J	0.44 U	0.51 U	0.42	0.6	0.3 J	X	14	1
Benzo(g,h,i)perylene	0	0.86 J	0.45	0.18 J	0.51 U	0.58	0.87	0.53		16	100
Benzo(a)pyrene	0	1.3 J	0.76	0.25 J	0.51 U	0.84	1.4	0.85	X	31	1

Table A-4. Soil Data Table and Chemicals of Potential Concern for Bell Slip AOC  
Human Health Risk Characterization  
Buffalo Outer Harbor  
Buffalo, New York

Sample Name	D-SS2-2-12	D-SS3-2-12	SB-07 (0-1)	SB-08 (0-1)	SB-09 (0-1)	SB-07 (1-5)	SB-08 (1-5)	SB-09 (1-5)	Chemical of Potential Concern	Maximum Detected	NYSDEC / USEPA Residential Soil Standard
Start Depth	2	2	0	0	0	1	1	1			
End Depth	12	12	1	1	1	5	5	5			
Depth Unit	in	in	ft	ft	ft	ft	ft	ft			
Sample Date	8/16/2017	8/16/2017	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019	10/15/2019			
Bis(2-ethylhexyl)phthalate										0.58	39
Carbazole										0.19	27
Chrysene	0	1.4 J	0.73	0.23 J	0.51 U	0.79	1.1	0.77	X	34	1
Dibenz(a,h)anthracene	0	0	0.14 J	0.44 U	0.51 U	0.16 J	0.26 J	0.16 J	X	4.8	0.33
Dibenzofuran	0	0	0.13 J	0.44 U	0.51 U	0.1 J	0.41 U	0.092 J		13	14
Diethyl phthalate										0.21	5,000
Dimethyl phthalate										0.042	5,000
Fluoranthene	0	2.8	1.5	0.4 J	0.51 U	1.3	0.91	1.4		91	100
Fluorene	0	0	0.14 J	0.44 U	0.51 U	0.4 U	0.41 U	0.12 J		24	100
Indeno(1,2,3-cd)pyrene	0	0.93 J	0.52	0.19 J	0.51 U	0.64	1.1	0.46	X	18	0.5
2-Methylnaphthalene										0.17	24
3,4-Methylphenol	0	0	0.39 U	0.44 U	0.51 U	0.4 U	0.41 U	0.21 J		0.51	34
Naphthalene	0	0	0.12 J	0.44 U	0.51 U	0.14 J	0.41 U	0.45 U		13	100
Phenanthrene	0	1.9	1.2	0.2 J	0.51 U	0.8	0.36 J	0.95	X	110	100
Phenol	0	0	0.39 U	0.44 U	0.51 U	0.4 U	0.41 U	0.45 U		2.6	100
Pyrene	0	2.3	1.2	0.34 J	0.51 U	1.1	0.82	1.2		72	100
Acetone										0.69	100
Benzene										0.00097	2.9
n-Butylbenzene										0.015	100
sec-Butylbenzene										0.038	100
tert-Butylbenzene										0.0096	100
1,4-Dichlorobenzene										0.0019	13
cis-1,2-Dichloroethene										0.0036	100
Ethylbenzene										0.00048	41
Methyl ethyl ketone										0.2	100
Methylene chloride										0.0028	51
n-Propylbenzene										0.012	100
Tetrachloroethene (PCE)										0.044	5.5
Toluene										0.0015	100
1,2,4-Trimethylbenzene										0.014	52
1,3,5-Trimethylbenzene										0.0061	52
Vinyl chloride										0.0035	0.9
Total Xylene										0.0038	100

Footnotes:

<sup>(1)</sup> Calcium, iron, magnesium, potassium and sodium excluded as COCs.

General Notes:

1. Units are milligrams per kilogram (mg/kg); refer to original reports for data qualifier codes.
2. Only analytes detected in soil are presented here.
3. Analytes included as COCs if maximum detected concentration exceeds residential soil standards.
4. Several analytes evaluated as COCs for other AOCs were included as COCs even though concentrations do not exceed residential soil standards.

***Appendix A-5 Wilkeson Pointe - Undeveloped Portion AOC***



## Appendix B

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### **Risk Calculation Reports and Supporting Material**

Appendix B-1 Area D AOC

Appendix B-2 Area C – Cottonwood Copse AOC

Appendix B-3 Area C – South and East of Cottonwood Copse AOC

Appendix B-4 Bell Slip AOC

Appendix B-5 Wilkeson Pointe - Undeveloped Portion AOC

## *Appendix B-1 Area D AOC*



# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on U <sub>m</sub> /U <sub>c</sub> ) unitless	0.194	0.194
n (total soil porosity) L <sub>poro</sub> /L <sub>soil</sub>	0.43396	0.43396
p <sub>b</sub> (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
p <sub>b</sub> (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
p <sub>c</sub> (soil particle density) g/cm <sup>3</sup>	2.65	2.65
Q/C <sub>wind</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
Q/C <sub>soil</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
Q/C <sub>veg</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
A <sub>c</sub> (PEF acres)	0.5	0.5
A <sub>c</sub> (VF acres)	0.5	0.5
A <sub>c</sub> (VF mass-limit acres)	0.5	0.5
AF <sub>hand</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
AF <sub>face</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
AF <sub>neck</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
AF <sub>leg</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
AF <sub>rec-a</sub> (skin adherence factor - adult) mg/cm <sup>2</sup>	0.07	0.07
AF <sub>rec-c</sub> (skin adherence factor - child) mg/cm <sup>2</sup>	0.2	0.2

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
AT <sub>rec</sub> (averaging time)	365	365
BW <sub>n,c</sub> (body weight) kg	15	15
BW <sub>γ,c</sub> (body weight) kg	15	15
BW <sub>6-16</sub> (body weight) kg	80	80
BW <sub>16-20</sub> (body weight) kg	80	80
BW <sub>rec,a</sub> (body weight - adult) kg	80	80
BW <sub>rec,c</sub> (body weight - child) kg	15	15
DFS <sub>rec,arti</sub> (age-adjusted soil dermal factor) mg/kg	.	27767.6
DFS <sub>M,rec,arti</sub> (mutagenic age-adjusted soil dermal factor) mg/kg	.	115018.4
ED <sub>rec</sub> (exposure duration - recreator) years	26	26
ED <sub>n,c</sub> (exposure duration) year	2	2
ED <sub>γ,c</sub> (exposure duration) year	4	4
ED <sub>6-16</sub> (exposure duration) year	10	10
ED <sub>16-20</sub> (exposure duration) year	10	10
ED <sub>rec,c</sub> (exposure duration - child) years	6	6
EF <sub>rec</sub> (exposure frequency) days/year	.	94
EF <sub>n,c</sub> (exposure frequency) days/year	.	94
EF <sub>γ,c</sub> (exposure frequency) days/year	.	94
EF <sub>6-16</sub> (exposure frequency) days/year	.	94
EF <sub>16-20</sub> (exposure frequency) days/year	.	94
EF <sub>rec,a</sub> (exposure frequency - adult) days/year	.	94
EF <sub>rec,c</sub> (exposure frequency - child) days/year	.	94
ET <sub>rec</sub> (exposure time - recreator) hours/day	.	3
ET <sub>n,c</sub> (exposure time) hours/day	.	3
ET <sub>γ,c</sub> (exposure time) hours/day	.	3
ET <sub>6-16</sub> (exposure time) hours/day	.	3
ET <sub>16-20</sub> (exposure time) hours/day	.	3
ET <sub>rec,a</sub> (adult exposure time) hours/day	.	3
ET <sub>rec,c</sub> (child exposure time) hours/day	.	3
THQ (target hazard quotient) unitless	0.1	0.1

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
IFS <sub>recre-adi</sub> (age-adjusted soil ingestion factor) mg/kg	.	9870
IFSM <sub>recre-adi</sub> (mutagenic age-adjusted soil ingestion factor) mg/kg	.	44806.667
IRS <sub>n,s</sub> (soil intake rate) mg/day	200	200
IRS <sub>γ,s</sub> (soil intake rate) mg/day	200	200
IRS <sub>κ-1,s</sub> (soil intake rate) mg/day	100	100
IRS <sub>1κ-20</sub> (soil intake rate) mg/day	100	100
IRS <sub>recre-a</sub> (soil intake rate - adult) mg/day	100	100
IRS <sub>recre-r</sub> (soil intake rate - child) mg/day	200	200
LT (lifetime - recreator) years	70	70
SA <sub>n,s</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>γ,s</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>κ-1,s</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>1κ-20</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>recre-a</sub> (skin surface area - adult) cm <sup>2</sup> /day	6032	6032
SA <sub>recre-r</sub> (skin surface area - child) cm <sup>2</sup> /day	2373	2373
TR (target risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

# Site-specific Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref
Aldrin	309-00-2	No	Yes	Organics	1.70E+01	I	4.90E-03	I	3.00E-05	I	-	
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-	
Aroclor 1248	12672-29-6	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-	
Aroclor 1254	11097-69-1	No	Yes	Organics	2.00E+00	S	5.71E-04	S	2.00E-05	I	-	
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-	
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-	
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-	
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-	
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-	
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-	
DDD, p,p'- (DDD)	72-54-8	No	No	Organics	2.40E-01	I	6.90E-05	C	3.00E-05	X	-	
DDT	50-29-3	No	No	Organics	3.40E-01	I	9.70E-05	I	5.00E-04	I	-	
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-	
Endrin	72-20-8	No	No	Organics	-		-		3.00E-04	I	-	
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I
Phenanthrene	85-01-8	No	Yes	Organics	-		-		-		-	
Silver	7440-22-4	No	No	Inorganics	-		-		5.00E-03	I	-	
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-	

# Site-specific

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref
1	-	1	-	1.70E-02	8.20E+04	4.92E+02	4.40E-05	1.80E-03	PHYSPROP	603.01	EPI
1	-	1	-	-	-	1.50E+03	-	-		2792.15	CRC89
0.15	-	1	-	-	-	4.50E+01	-	-		1908.15	PHYSPROP
1	0.14	1	-	1.00E-01	7.65E+04	4.59E+02	4.40E-04	1.80E-02	PHYSPROP	613.15	EPI
1	0.14	1	-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI
1	0.14	1	-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI
1	0.03	0.6	-	-	-	2.90E+01	-	-		888.15	PHYSPROP
0.07	-	1	-	-	-	4.10E+01	-	-		1873.15	PHYSPROP
1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP
1	0.13	1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP
1	0.13	1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI
1	0.13	1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP
0.025	0.001	1	-	-	-	7.50E+01	-	-		1038.15	PHYSPROP
0.013	-	1	-	-	-	1.80E+06	-	-		-	
1	0.13	1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP
1	-	1	-	-	-	4.50E+01	-	-		3200.15	CRC89
1	-	1	-	-	-	3.50E+01	-	-		2868.15	PHYSPROP
1	0.1	1	-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP
1	0.03	1	-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP
1	0.13	1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP
1	0.1	1	-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI
1	0.13	1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP
0.04	-	1	-	-	-	6.50E+01	-	-		2368.15	PHYSPROP
1	-	1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP
1	0.13	1	-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP
0.04	-	1	-	-	-	8.30E+00	-	-		2273.15	PHYSPROP
1	-	1	-	5.47E+04	-	-	-	-		-	

# Site-specific Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)
627.225	Approx. from Tcrit=1.5xTBoil	PEST	2.28E-02	5.84E-06	4.52E-09	1.36E+09	1.72E+06	1.52E-01	-	2.92E+01
6700	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
5070	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
919.725	Approx. from Tcrit=1.5xTBoil	PCB	2.41E-02	6.18E-06	5.03E-08	1.36E+09	5.14E+05	1.29E+00	3.29E+00	7.52E+01
957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02	6.10E-06	1.87E-08	1.36E+09	8.43E+05	1.29E+00	3.29E+00	1.23E+02
987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09	1.36E+09	1.31E+06	1.29E+00	3.29E+00	1.92E+02
1673	CRC89	INORGANIC	-	-	-	1.36E+09	-	2.88E+00	2.04E+01	2.64E+04
3572.13	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09	4.41E+06	5.70E+00	1.71E+01	2.21E+03
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E+01	1.71E+02	6.84E+06
2291	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	6.32E+04
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	-	1.36E+09	-	5.70E+02	1.71E+03	6.84E+07
7398.48	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	1.26E+04
5123	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02	4.74E-06	-	1.36E+09	-	1.08E+01	3.83E+01	1.65E+06
799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02	4.43E-06	-	1.36E+09	-	7.61E+00	9.02E+01	1.17E+06
-		PAH	4.46E-02	5.21E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
-		PEST	3.62E-02	4.22E-06	-	1.36E+09	-	-	-	-
-		PAH	4.48E-02	5.23E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
4325	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-
869	YAWS	PAH	3.45E-02	6.69E-06	3.21E-08	1.36E+09	6.43E+05	-	-	-
6410	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-

# Site-specific

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL Child THQ=0.1 (mg/kg)	Dermal SL Child THQ=0.1 (mg/kg)	Inhalation SL Child THQ=0.1 (mg/kg)	Noncarcinogenic SL Child THI=0.1 (mg/kg)	Ingestion SL Adult THQ=0.1 (mg/kg)	Dermal SL Adult THQ=0.1 (mg/kg)	Inhalation SL Adult THQ=0.1 (mg/kg)	Noncarcinogenic SL Adult THI=0.1 (mg/kg)	Screening Level (mg/kg)
1.51E-01	8.74E-01	-	-	8.74E-01	9.32E+00	-	-	9.32E+00	1.51E-01 ca**
-	2.91E+04	-	2.11E+07	2.91E+04	3.11E+05	-	2.11E+07	3.06E+05	2.91E+04 nc
-	1.16E+01	-	-	1.16E+01	1.24E+02	-	-	1.24E+02	1.16E+01 nc
9.17E-01	-	-	-	-	-	-	-	-	9.17E-01 ca
9.22E-01	5.82E-01	1.75E+00	-	4.37E-01	6.21E+00	1.05E+01	-	3.90E+00	4.37E-01 nc
9.24E-01	-	-	-	-	-	-	-	-	9.24E-01 ca
2.52E+00	1.46E+01	1.23E+02	6.33E+04	1.30E+01	1.55E+02	7.36E+02	6.33E+04	1.28E+02	2.52E+00 ca**
-	5.82E+03	-	2.11E+06	5.81E+03	6.21E+04	-	2.11E+06	6.04E+04	5.81E+03 nc
4.27E+00	-	-	-	-	-	-	-	-	4.27E+00 ca
4.28E-01	8.74E+00	2.83E+01	8.45E+03	6.67E+00	9.32E+01	1.70E+02	8.45E+03	5.97E+01	4.28E-01 ca*
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca
4.28E+01	-	-	-	-	-	-	-	-	4.28E+01 ca
6.32E+04	2.91E+01	3.07E+02	4.22E+04	2.66E+01	3.11E+02	1.84E+03	4.22E+04	2.64E+02	2.66E+01 nc
-	4.37E+04	-	-	4.37E+04	4.66E+05	-	-	4.66E+05	4.37E+04 nc
4.28E+02	-	-	-	-	-	-	-	-	4.28E+02 ca
1.26E+04	8.74E+00	-	2.53E+04	8.73E+00	9.32E+01	-	2.53E+04	9.28E+01	8.73E+00 nc
-	1.16E+03	-	-	1.16E+03	1.24E+04	-	-	1.24E+04	1.16E+03 nc
8.42E+00	8.74E-01	3.68E+00	-	7.06E-01	9.32E+00	2.21E+01	-	6.55E+00	7.06E-01 nc
7.02E+00	1.46E+01	2.05E+02	-	1.36E+01	1.55E+02	1.23E+03	-	1.38E+02	7.02E+00 ca**
4.28E-01	-	-	-	-	-	-	-	-	4.28E-01 ca
-	8.74E+00	3.68E+01	-	7.06E+00	9.32E+01	2.21E+02	-	6.55E+01	7.06E+00 nc
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca
-	6.99E+02	-	2.11E+05	6.97E+02	7.46E+03	-	2.11E+05	7.20E+03	6.97E+02 nc
-	-	-	3.23E+01	3.23E+01	-	-	3.23E+01	3.23E+01	3.23E+01 sat
-	-	-	-	-	-	-	-	-	
-	1.46E+02	-	-	1.46E+02	1.55E+03	-	-	1.55E+03	1.46E+02 nc
-	5.82E-01	-	-	5.82E-01	6.21E+00	-	-	6.21E+00	5.82E-01 nc

# Site-specific

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		-		5.04E-03	S	1.00E-04	A
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-	



## Site-specific

### Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref
0.026	-	1	-	-	-	1.00E+03	-	-		3680.15	CRC89
1	-	1	-	-	-	6.20E+01	-	-		1181.15	PHYSPROP

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia}$ (cm <sup>2</sup> /s)	$D_{iw}$ (cm <sup>2</sup> /s)	$D_A$ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)
11325	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
3170	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL Child THQ=0.1 (mg/kg)	Dermal SL Child THQ=0.1 (mg/kg)	Inhalation SL Child THQ=0.1 (mg/kg)	Noncarcinogenic SL Child THI=0.1 (mg/kg)	Ingestion SL Adult THQ=0.1 (mg/kg)	Dermal SL Adult THQ=0.1 (mg/kg)	Inhalation SL Adult THQ=0.1 (mg/kg)	Noncarcinogenic SL Adult THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	1.47E+02	-	4.22E+05	1.47E+02	1.57E+03	-	4.22E+05	1.56E+03	1.47E+02 nc
-	8.74E+03	-	-	8.74E+03	9.32E+04	-	-	9.32E+04	8.74E+03 nc

# Site-specific Recreator Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)
Aldrin	1.70E+01	I	4.90E-03	I	3.00E-05	I	-	-	1	-	1	-	1.70E-02
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-
Aroclor 1248	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.00E-01
Aroclor 1254	2.00E+00	S	5.71E-04	S	2.00E-05	I	-	-	1	0.14	1	-	4.30E-02
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.44E-02
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-
DDD, p,p`- (DDD)	2.40E-01	I	6.90E-05	C	3.00E-05	X	-	-	1	0.1	1	-	9.00E-02
DDT	3.40E-01	I	9.70E-05	I	5.00E-04	I	-	-	1	0.03	1	-	5.50E-03
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03
Endrin	-	-	-	-	3.00E-04	I	-	-	1	0.1	1	-	2.50E-01
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02
Phenanthrene	-	-	-	-	-	-	-	-	1	0.13	1	-	1.15E+00
Silver	-	-	-	-	5.00E-03	I	-	-	0.04	-	1	-	-
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04
Vanadium and Compounds	-	-	-	-	5.04E-03	S	1.00E-04	A	0.026	-	1	-	-
Zinc and Compounds	-	-	-	-	3.00E-01	I	-	-	1	-	1	-	-
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Recreator Risk for Soil

Chemical	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref
Aldrin	8.20E+04	4.92E+02	4.40E-05	1.80E-03	PHYSROP	603.01	EPI	627.225	Approx. from Tcrit=1.5xTBoil
Aluminum	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89
Antimony (metallic)	-	4.50E+01	-	-		1908.15	PHYSROP	5070	YAWS
Aroclor 1248	7.65E+04	4.59E+02	4.40E-04	1.80E-02	PHYSROP	613.15	EPI	919.725	Approx. from Tcrit=1.5xTBoil
Aroclor 1254	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil
Aroclor 1260	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil
Arsenic, Inorganic	-	2.90E+01	-	-		888.15	PHYSROP	1673	CRC89
Barium	-	4.10E+01	-	-		1873.15	PHYSROP	3572.13	YAWS
Benz[a]anthracene	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS
Benzo[a]pyrene	5.87E+05	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-	
Benzo[b]fluoranthene	5.99E+05	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-	
Benzo[k]fluoranthene	5.87E+05	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-	
Cadmium (Diet)	-	7.50E+01	-	-		1038.15	PHYSROP	2291	YAWS
Chromium(III), Insoluble Salts	-	1.80E+06	-	-		-		-	
Chrysene	1.81E+05	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS
Cobalt	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS
Copper	-	3.50E+01	-	-		2868.15	PHYSROP	5123	YAWS
DDD, p,p'- (DDD)	1.18E+05	-	6.60E-06	2.70E-04	PHYSROP	623.15	PHYSROP	934.725	Approx. from Tcrit=1.5xTBoil
DDT	1.69E+05	-	8.32E-06	3.40E-04	PHYSROP	533.15	PHYSROP	799.725	Approx. from Tcrit=1.5xTBoil
Dibenz[a,h]anthracene	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-	
Endrin	2.01E+04	-	6.36E-06	2.60E-04	PHYSROP	603.15	EPI	-	
Indeno[1,2,3-cd]pyrene	1.95E+06	-	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-	
Manganese (Non-diet)	-	6.50E+01	-	-		2368.15	PHYSROP	4325	CRC89
Mercury (elemental)	-	5.20E+01	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP	1764	CRC89
Phenanthrene	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSROP	613.15	PHYSROP	869	YAWS
Silver	-	8.30E+00	-	-		2273.15	PHYSROP	6410	CRC89
Thallium Sulfate	-	-	-	-		-		-	
Vanadium and Compounds	-	1.00E+03	-	-		3680.15	CRC89	11325	YAWS
Zinc and Compounds	-	6.20E+01	-	-		1181.15	PHYSROP	3170	YAWS
<i>*Total Risk/HL</i>	-	-	-	-		-		-	

# Site-specific Recreator Risk for Soil

Chemical	Chemical Type	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk
Aldrin	PEST	2.28E-02	5.84E-06	4.52E-09	1.36E+09	1.72E+06	6.50E-03	4.27E-08	-	2.22E-10
Aluminum	INORGANIC	-	-	-	1.36E+09	-	1.03E+04	-	-	-
Antimony (metallic)	INORGANIC	-	-	-	1.36E+09	-	2.90E+00	-	-	-
Aroclor 1248	PCB	2.41E-02	6.18E-06	5.03E-08	1.36E+09	5.14E+05	2.47E-01	1.91E-07	7.52E-08	3.28E-09
Aroclor 1254	PCB	2.37E-02	6.10E-06	1.87E-08	1.36E+09	8.43E+05	6.99E-01	5.40E-07	2.13E-07	5.67E-09
Aroclor 1260	PCB	2.20E-02	5.61E-06	7.70E-09	1.36E+09	1.31E+06	2.06E-01	1.59E-07	6.27E-08	1.07E-09
Arsenic, Inorganic	INORGANIC	-	-	-	1.36E+09	-	8.54E+00	2.97E-06	4.18E-07	3.23E-10
Barium	INORGANIC	-	-	-	1.36E+09	-	1.53E+02	-	-	-
Benz[a]anthracene	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09	4.41E+06	3.46E+00	6.07E-07	2.02E-07	1.56E-09
Benzo[a]pyrene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	2.92E+00	5.12E-06	1.71E-06	4.27E-11
Benzo[b]fluoranthene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	3.52E+00	6.17E-07	2.06E-07	5.14E-12
Benzo[k]fluoranthene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	2.31E+00	4.05E-08	1.35E-08	3.38E-13
Cadmium (Diet)	INORGANIC	-	-	-	1.36E+09	-	4.02E+00	-	-	6.36E-11
Chromium(III), Insoluble Salts	INORGANIC	-	-	-	1.36E+09	-	5.36E+01	-	-	-
Chrysene	PAH	2.61E-02	6.75E-06	-	1.36E+09	-	2.97E+00	5.21E-09	1.74E-09	4.34E-14
Cobalt	INORGANIC	-	-	-	1.36E+09	-	4.57E+00	-	-	3.62E-10
Copper	INORGANIC	-	-	-	1.36E+09	-	2.82E+02	-	-	-
DDD, p,p`- (DDD)	PEST	4.06E-02	4.74E-06	-	1.36E+09	-	5.40E-02	5.01E-09	1.41E-09	3.28E-14
DDT	PEST	3.79E-02	4.43E-06	-	1.36E+09	-	5.43E-02	7.13E-09	6.02E-10	4.63E-14
Dibenz[a,h]anthracene	PAH	4.46E-02	5.21E-06	-	1.36E+09	-	7.89E-01	1.38E-06	4.62E-07	1.15E-11
Endrin	PEST	3.62E-02	4.22E-06	-	1.36E+09	-	2.40E-02	-	-	-
Indeno[1,2,3-cd]pyrene	PAH	4.48E-02	5.23E-06	-	1.36E+09	-	2.51E+00	4.40E-07	1.47E-07	3.67E-12
Manganese (Non-diet)	INORGANIC	-	-	-	1.36E+09	-	1.09E+03	-	-	-
Mercury (elemental)	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09	3.47E+04	3.75E-01	-	-	-
Phenanthrene	PAH	3.45E-02	6.69E-06	3.21E-08	1.36E+09	6.43E+05	1.25E+01	-	-	-
Silver	INORGANIC	-	-	-	1.36E+09	-	3.48E+00	-	-	-
Thallium Sulfate	INORGANIC	-	-	-	1.36E+09	-	2.68E+00	-	-	-
Vanadium and Compounds	INORGANIC	-	-	-	1.36E+09	-	2.13E+01	-	-	-
Zinc and Compounds	INORGANIC	-	-	-	1.36E+09	-	7.29E+02	-	-	-
<i>*Total Risk/HI</i>		-	-	-	-	-	-	1.21E-05	3.51E-06	1.26E-08

# Site-specific Recreator Risk for Soil

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Inhalation Child HQ	Noncarcinogenic Child HI	Ingestion Adult HQ	Dermal Adult HQ	Inhalation Adult HQ	Noncarcinogenic Adult HI
Aldrin	4.29E-08	7.44E-04	-	-	7.44E-04	6.97E-05	-	-	6.97E-05
Aluminum	-	3.54E-02	-	4.88E-05	3.54E-02	3.32E-03	-	4.88E-05	3.37E-03
Antimony (metallic)	-	2.49E-02	-	-	2.49E-02	2.33E-03	-	-	2.33E-03
Aroclor 1248	2.69E-07	-	-	-	-	-	-	-	-
Aroclor 1254	7.58E-07	1.20E-01	3.99E-02	-	1.60E-01	1.13E-02	6.65E-03	-	1.79E-02
Aroclor 1260	2.23E-07	-	-	-	-	-	-	-	-
Arsenic, Inorganic	3.39E-06	5.86E-02	6.96E-03	1.35E-05	6.56E-02	5.50E-03	1.16E-03	1.35E-05	6.67E-03
Barium	-	2.63E-03	-	7.25E-06	2.63E-03	2.46E-04	-	7.25E-06	2.54E-04
Benz[a]anthracene	8.11E-07	-	-	-	-	-	-	-	-
Benzo[a]pyrene	6.83E-06	3.34E-02	1.03E-02	3.46E-05	4.38E-02	3.13E-03	1.72E-03	3.46E-05	4.89E-03
Benzo[b]fluoranthene	8.23E-07	-	-	-	-	-	-	-	-
Benzo[k]fluoranthene	5.40E-08	-	-	-	-	-	-	-	-
Cadmium (Diet)	6.36E-11	1.38E-02	1.31E-03	9.52E-06	1.51E-02	1.29E-03	2.19E-04	9.52E-06	1.52E-03
Chromium(III), Insoluble Salts	-	1.23E-04	-	-	1.23E-04	1.15E-05	-	-	1.15E-05
Chrysene	6.95E-09	-	-	-	-	-	-	-	-
Cobalt	3.62E-10	5.23E-02	-	1.80E-05	5.23E-02	4.90E-03	-	1.80E-05	4.92E-03
Copper	-	2.42E-02	-	-	2.42E-02	2.27E-03	-	-	2.27E-03
DDD, p,p`- (DDD)	6.41E-09	6.18E-03	1.47E-03	-	7.65E-03	5.79E-04	2.45E-04	-	8.24E-04
DDT	7.73E-09	3.73E-04	2.65E-05	-	3.99E-04	3.50E-05	4.43E-06	-	3.94E-05
Dibenz[a,h]anthracene	1.85E-06	-	-	-	-	-	-	-	-
Endrin	-	2.75E-04	6.52E-05	-	3.40E-04	2.58E-05	1.09E-05	-	3.66E-05
Indeno[1,2,3-cd]pyrene	5.87E-07	-	-	-	-	-	-	-	-
Manganese (Non-diet)	-	1.55E-01	-	5.14E-04	1.56E-01	1.46E-02	-	5.14E-04	1.51E-02
Mercury (elemental)	-	-	-	1.16E-03	1.16E-03	-	-	1.16E-03	1.16E-03
Phenanthrene	-	-	-	-	-	-	-	-	-
Silver	-	2.39E-03	-	-	2.39E-03	2.24E-04	-	-	2.24E-04
Thallium Sulfate	-	4.60E-01	-	-	4.60E-01	4.31E-02	-	-	4.31E-02
Vanadium and Compounds	-	1.45E-02	-	5.03E-06	1.45E-02	1.36E-03	-	5.03E-06	1.36E-03
Zinc and Compounds	-	8.34E-03	-	-	8.34E-03	7.82E-04	-	-	7.82E-04
<b>*Total Risk/HI</b>	<b>1.57E-05</b>	<b>1.01E+00</b>	<b>6.00E-02</b>	<b>1.81E-03</b>	<b>1.08E+00</b>	<b>9.50E-02</b>	<b>1.00E-02</b>	<b>1.81E-03</b>	<b>1.07E-01</b>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{vnl}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{vnl}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124



# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>0</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aldrin	309-00-2	No	Yes	Organics	1.70E+01	I	4.90E-03	I	3.00E-05	I	-		1	-	1
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Aroclor 1248	12672-29-6	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14	1
Aroclor 1254	11097-69-1	No	Yes	Organics	2.00E+00	S	5.71E-04	S	2.00E-05	I	-		1	0.14	1
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	1.70E-02	8.20E+04	4.92E+02	4.40E-05	1.80E-03	PHYSPROP	603.01	EPI	627.225	Approx. from Tcrit=1.5xTBoil	PEST	2.28E-02
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-
-	1.00E-01	7.65E+04	4.59E+02	4.40E-04	1.80E-02	PHYSPROP	613.15	EPI	919.725	Approx. from Tcrit=1.5xTBoil	PCB	2.41E-02
-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02
-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-		PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-		PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-		PAH	4.76E-02
-	-	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC	-
-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02

# Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

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D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
5.84E-06	4.52E-09	1.36E+09	1.72E+06	3.88E-01	-	8.65E+00	3.71E-01	7.06E+00	-	-	7.06E+00	3.71E-01 ca*
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
6.18E-06	5.03E-08	1.36E+09	5.14E+05	3.30E+00	5.56E+00	2.22E+01	1.89E+00	-	-	-	-	1.89E+00 ca
6.10E-06	1.87E-08	1.36E+09	8.43E+05	3.30E+00	5.56E+00	3.64E+01	1.96E+00	4.71E+00	7.95E+00	-	2.96E+00	1.96E+00 ca**
5.61E-06	7.70E-09	1.36E+09	1.31E+06	3.30E+00	5.56E+00	5.68E+01	2.00E+00	-	-	-	-	2.00E+00 ca
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	1.87E+04	1.87E+04	2.35E+02	1.39E+03	1.20E+04	1.98E+02	1.98E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca

## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1
DDD, p,p'- (DDD)	72-54-8	No	No	Organics	2.40E-01	I	6.90E-05	C	3.00E-05	X	-		1	0.1	1
DDT	50-29-3	No	No	Organics	3.40E-01	I	9.70E-05	I	5.00E-04	I	-		1	0.03	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1
Endrin	72-20-8	No	No	Organics	-		-		3.00E-04	I	-		1	0.1	1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Phenanthrene	85-01-8	No	Yes	Organics	-		-		-		-		1	0.13	1
Silver	7440-22-4	No	No	Inorganics	-		-		5.00E-03	I	-		0.04	-	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		-		5.04E-03	S	1.00E-04	A	0.026	-	1
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-		1	-	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-
-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02
-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI	-		PEST	3.62E-02
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS	PAH	3.45E-02
-	-	-	8.30E+00	-	-		2273.15	PHYSPROP	6410	CRC89	INORGANIC	-
-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
-	-	-	1.00E+03	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-
-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-

# Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

D <sub>w</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc
4.74E-06	-	1.36E+09	-	2.75E+01	6.49E+01	4.87E+05	1.93E+01	7.06E+00	1.67E+01	-	4.96E+00	4.96E+00 nc
4.43E-06	-	1.36E+09	-	1.94E+01	1.53E+02	3.47E+05	1.72E+01	1.18E+02	9.27E+02	-	1.04E+02	1.72E+01 ca**
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca
4.22E-06	-	1.36E+09	-	-	-	-	-	7.06E+01	1.67E+02	-	4.96E+01	4.96E+01 nc
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
6.69E-06	3.21E-08	1.36E+09	6.43E+05	-	-	-	-	-	-	-	-	
-	-	1.36E+09	-	-	-	-	-	1.18E+03	-	-	1.18E+03	1.18E+03 nc
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc
-	-	1.36E+09	-	-	-	-	-	1.19E+03	-	1.20E+05	1.18E+03	1.18E+03 nc
-	-	1.36E+09	-	-	-	-	-	7.06E+04	-	-	7.06E+04	7.06E+04 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aldrin	1.70E+01	I	4.90E-03	I	3.00E-05	I	-	-	1	-	1	-	1.70E-02	8.20E+04	4.92E+02
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-	4.50E+01
Aroclor 1248	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.00E-01	7.65E+04	4.59E+02
Aroclor 1254	2.00E+00	S	5.71E-04	S	2.00E-05	I	-	-	1	0.14	1	-	4.30E-02	1.31E+05	7.83E+02
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.44E-02	3.50E+05	2.10E+03
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05	-
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-	-	7.50E+01
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-	3.50E+01
DDD, p,p'- (DDD)	2.40E-01	I	6.90E-05	C	3.00E-05	X	-	-	1	0.1	1	-	9.00E-02	1.18E+05	-
DDT	3.40E-01	I	9.70E-05	I	5.00E-04	I	-	-	1	0.03	1	-	5.50E-03	1.69E+05	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06	-
Endrin	-	-	-	-	3.00E-04	I	-	-	1	0.1	1	-	2.50E-01	2.01E+04	-
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01



# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>g</sub> <sup>a</sup> (cm <sup>2</sup> /s)	D <sub>iw</sub> <sup>b</sup> (cm <sup>2</sup> /s)	D <sub>A</sub> <sup>c</sup> (cm <sup>2</sup> /s)
Aldrin	4.40E-05	1.80E-03	PHYSROP	603.01	EPI	627.225	Approx. from Tcrit=1.5xTBoil	PEST	2.28E-02	5.84E-06	4.52E-09
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-
Antimony (metallic)	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-	-	-
Aroclor 1248	4.40E-04	1.80E-02	PHYSROP	613.15	EPI	919.725	Approx. from Tcrit=1.5xTBoil	PCB	2.41E-02	6.18E-06	5.03E-08
Aroclor 1254	2.83E-04	1.16E-02	PHYSROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02	6.10E-06	1.87E-08
Aroclor 1260	3.36E-04	1.37E-02	PHYSROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09
Arsenic, Inorganic	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-	-	-
Barium	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-	-	-
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02	5.56E-06	-
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-
Cadmium (Diet)	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-	-	-
Chromium(III), Insoluble Salts	-	-		-		-		INORGANIC	-	-	-
Chrysene	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	-
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-
Copper	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-	-	-
DDD, p,p'- (DDD)	6.60E-06	2.70E-04	PHYSROP	623.15	PHYSROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02	4.74E-06	-
DDT	8.32E-06	3.40E-04	PHYSROP	533.15	PHYSROP	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02	4.43E-06	-
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02	5.21E-06	-
Endrin	6.36E-06	2.60E-04	PHYSROP	603.15	EPI	-		PEST	3.62E-02	4.22E-06	-
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-		PAH	4.48E-02	5.23E-06	-
Manganese (Non-diet)	-	-		2368.15	PHYSROP	4325	CRC89	INORGANIC	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m³/kg)	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aldrin	1.36E+09	1.72E+06	6.50E-03	1.68E-08	-	7.52E-10	1.75E-08	9.20E-05	-	-	9.20E-05
Aluminum	1.36E+09	-	1.03E+04	-	-	-	-	4.38E-03	-	1.72E-04	4.55E-03
Antimony (metallic)	1.36E+09	-	2.90E+00	-	-	-	-	3.08E-03	-	-	3.08E-03
Aroclor 1248	1.36E+09	5.14E+05	2.47E-01	7.49E-08	4.44E-08	1.11E-08	1.30E-07	-	-	-	-
Aroclor 1254	1.36E+09	8.43E+05	6.99E-01	2.12E-07	1.26E-07	1.92E-08	3.57E-07	1.48E-02	8.79E-03	-	2.36E-02
Aroclor 1260	1.36E+09	1.31E+06	2.06E-01	6.25E-08	3.70E-08	3.63E-09	1.03E-07	-	-	-	-
Arsenic, Inorganic	1.36E+09	-	8.54E+00	1.17E-06	2.47E-07	1.09E-09	1.41E-06	7.25E-03	1.53E-03	4.74E-05	8.84E-03
Barium	1.36E+09	-	1.53E+02	-	-	-	-	3.25E-04	-	2.55E-05	3.50E-04
Benz[a]anthracene	1.36E+09	4.41E+06	3.46E+00	5.25E-08	2.89E-08	1.91E-09	8.33E-08	-	-	-	-
Benzo[a]pyrene	1.36E+09	-	2.92E+00	4.43E-07	2.44E-07	5.21E-11	6.87E-07	4.13E-03	2.27E-03	1.22E-04	6.53E-03
Benzo[b]fluoranthene	1.36E+09	-	3.52E+00	5.34E-08	2.94E-08	6.28E-12	8.28E-08	-	-	-	-
Benzo[k]fluoranthene	1.36E+09	-	2.31E+00	3.50E-09	1.93E-09	4.12E-13	5.43E-09	-	-	-	-
Cadmium (Diet)	1.36E+09	-	4.02E+00	-	-	2.15E-10	2.15E-10	1.71E-03	2.89E-04	3.35E-05	2.03E-03
Chromium(III), Insoluble Salts	1.36E+09	-	5.36E+01	-	-	-	-	1.52E-05	-	-	1.52E-05
Chrysene	1.36E+09	-	2.97E+00	4.50E-10	2.48E-10	5.30E-14	6.98E-10	-	-	-	-
Cobalt	1.36E+09	-	4.57E+00	-	-	1.22E-09	1.22E-09	6.47E-03	-	6.35E-05	6.53E-03
Copper	1.36E+09	-	2.82E+02	-	-	-	-	2.99E-03	-	-	2.99E-03
DDD, p,p'- (DDD)	1.36E+09	-	5.40E-02	1.97E-09	8.32E-10	1.11E-13	2.80E-09	7.64E-04	3.24E-04	-	1.09E-03
DDT	1.36E+09	-	5.43E-02	2.80E-09	3.56E-10	1.57E-13	3.16E-09	4.61E-05	5.86E-06	-	5.20E-05
Dibenz[a,h]anthracene	1.36E+09	-	7.89E-01	1.20E-07	6.58E-08	1.41E-11	1.86E-07	-	-	-	-
Endrin	1.36E+09	-	2.40E-02	-	-	-	-	3.40E-05	1.44E-05	-	4.84E-05
Indeno[1,2,3-cd]pyrene	1.36E+09	-	2.51E+00	3.81E-08	2.09E-08	4.48E-12	5.90E-08	-	-	-	-
Manganese (Non-diet)	1.36E+09	-	1.09E+03	-	-	-	-	1.92E-02	-	1.81E-03	2.10E-02

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Mercury (elemental)	-		-		-		3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Phenanthrene	-		-		-		-		1	0.13	1	-	1.15E+00	1.67E+04	1.00E+02
Silver	-		-		5.00E-03	I	-		0.04	-	1	-	-	-	8.30E+00
Thallium Sulfate	-		-		2.00E-05	X	-		1	-	1	-	5.47E+04	-	-
Vanadium and Compounds	-		-		5.04E-03	S	1.00E-04	A	0.026	-	1	-	-	-	1.00E+03
Zinc and Compounds	-		-		3.00E-01	I	-		1	-	1	-	-	-	6.20E+01
<i>*Total Risk/HI</i>	-		-		-		-		-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>g</sub> <sup>a</sup> (cm <sup>2</sup> /s)	D <sub>iw</sub> <sup>b</sup> (cm <sup>2</sup> /s)	D <sub>A</sub> <sup>c</sup> (cm <sup>2</sup> /s)
Mercury (elemental)	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05
Phenanthrene	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS	PAH	3.45E-02	6.69E-06	3.21E-08
Silver	-	-		2273.15	PHYSPROP	6410	CRC89	INORGANIC	-	-	-
Thallium Sulfate	-	-		-		-		INORGANIC	-	-	-
Vanadium and Compounds	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-	-	-
Zinc and Compounds	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-	-	-
<i>*Total Risk/HL</i>	-	-		-		-			-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Mercury (elemental)	1.36E+09	3.47E+04	3.75E-01	-	-	-	-	-	-	4.08E-03	4.08E-03
Phenanthrene	1.36E+09	6.43E+05	1.25E+01	-	-	-	-	-	-	-	-
Silver	1.36E+09	-	3.48E+00	-	-	-	-	2.96E-04	-	-	2.96E-04
Thallium Sulfate	1.36E+09	-	2.68E+00	-	-	-	-	5.69E-02	-	-	5.69E-02
Vanadium and Compounds	1.36E+09	-	2.13E+01	-	-	-	-	1.79E-03	-	1.77E-05	1.81E-03
Zinc and Compounds	1.36E+09	-	7.29E+02	-	-	-	-	1.03E-03	-	-	1.03E-03
<i>*Total Risk/HI</i>	-	-	-	<i>2.25E-06</i>	<i>8.46E-07</i>	<i>3.92E-08</i>	<i>3.13E-06</i>	<i>1.25E-01</i>	<i>1.32E-02</i>	<i>6.37E-03</i>	<i>1.45E-01</i>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{soil}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{veg}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124

# Site-specific Outdoor Worker Equation Inputs for Soil

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Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

# Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aldrin	309-00-2	No	Yes	Organics	1.70E+01	I	4.90E-03	I	3.00E-05	I	-		1	-	1
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Aroclor 1248	12672-29-6	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14	1
Aroclor 1254	11097-69-1	No	Yes	Organics	2.00E+00	S	5.71E-04	S	2.00E-05	I	-		1	0.14	1
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1



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Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	1.70E-02	8.20E+04	4.92E+02	4.40E-05	1.80E-03	PHYSPROP	603.01	EPI	627.225	Approx. from Tcrit=1.5xTBoil	PEST	2.28E-02
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-
-	1.00E-01	7.65E+04	4.59E+02	4.40E-04	1.80E-02	PHYSPROP	613.15	EPI	919.725	Approx. from Tcrit=1.5xTBoil	PCB	2.41E-02
-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02
-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-		PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-		PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-		PAH	4.76E-02
-	-	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC	-
-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02

# Site-specific

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D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
5.84E-06	4.52E-09	1.36E+09	1.72E+06	3.88E-01	-	8.65E+00	3.71E-01	7.06E+00	-	-	7.06E+00	3.71E-01 ca*
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
6.18E-06	5.03E-08	1.36E+09	5.14E+05	3.30E+00	5.56E+00	2.22E+01	1.89E+00	-	-	-	-	1.89E+00 ca
6.10E-06	1.87E-08	1.36E+09	8.43E+05	3.30E+00	5.56E+00	3.64E+01	1.96E+00	4.71E+00	7.95E+00	-	2.96E+00	1.96E+00 ca**
5.61E-06	7.70E-09	1.36E+09	1.31E+06	3.30E+00	5.56E+00	5.68E+01	2.00E+00	-	-	-	-	2.00E+00 ca
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	1.87E+04	1.87E+04	2.35E+02	1.39E+03	1.20E+04	1.98E+02	1.98E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca

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Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1
DDD, p,p'- (DDD)	72-54-8	No	No	Organics	2.40E-01	I	6.90E-05	C	3.00E-05	X	-		1	0.1	1
DDT	50-29-3	No	No	Organics	3.40E-01	I	9.70E-05	I	5.00E-04	I	-		1	0.03	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1
Endrin	72-20-8	No	No	Organics	-		-		3.00E-04	I	-		1	0.1	1
Hexachlorobenzene	118-74-1	No	Yes	Organics	1.60E+00	I	4.60E-04	I	8.00E-04	I	-		1	-	1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Phenanthrene	85-01-8	No	Yes	Organics	-		-		-		-		1	0.13	1
Silver	7440-22-4	No	No	Inorganics	-		-		5.00E-03	I	-		0.04	-	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		-		5.04E-03	S	1.00E-04	A	0.026	-	1
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-		1	-	1

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Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>1a</sub> (cm <sup>2</sup> /s)
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-
-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02
-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI	-		PEST	3.62E-02
-	6.20E-03	6.20E+03	3.72E+01	1.70E-03	6.95E-02	PHYSPROP	598.15	PHYSPROP	825	YAWS	PEST	2.90E-02
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS	PAH	3.45E-02
-	-	-	8.30E+00	-	-		2273.15	PHYSPROP	6410	CRC89	INORGANIC	-
-	5.47E+04	-	-	-	-		-	-	-		INORGANIC	-
-	-	-	1.00E+03	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-
-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-

# Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

D <sub>w</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc
4.74E-06	-	1.36E+09	-	2.75E+01	6.49E+01	4.87E+05	1.93E+01	7.06E+00	1.67E+01	-	4.96E+00	4.96E+00 nc
4.43E-06	-	1.36E+09	-	1.94E+01	1.53E+02	3.47E+05	1.72E+01	1.18E+02	9.27E+02	-	1.04E+02	1.72E+01 ca**
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca
4.22E-06	-	1.36E+09	-	-	-	-	-	7.06E+01	1.67E+02	-	4.96E+01	4.96E+01 nc
7.85E-06	2.88E-06	1.36E+09	6.80E+04	4.12E+00	-	3.65E+00	1.94E+00	1.88E+02	-	-	1.88E+02	1.94E+00 ca*
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
6.69E-06	3.21E-08	1.36E+09	6.43E+05	-	-	-	-	-	-	-	-	-
-	-	1.36E+09	-	-	-	-	-	1.18E+03	-	-	1.18E+03	1.18E+03 nc
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc
-	-	1.36E+09	-	-	-	-	-	1.19E+03	-	1.20E+05	1.18E+03	1.18E+03 nc
-	-	1.36E+09	-	-	-	-	-	7.06E+04	-	-	7.06E+04	7.06E+04 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aldrin	1.70E+01	I	4.90E-03	I	3.00E-05	I	-	-	1	-	1	-	1.70E-02	8.20E+04	4.92E+02
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-	4.50E+01
Aroclor 1248	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.00E-01	7.65E+04	4.59E+02
Aroclor 1254	2.00E+00	S	5.71E-04	S	2.00E-05	I	-	-	1	0.14	1	-	4.30E-02	1.31E+05	7.83E+02
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.44E-02	3.50E+05	2.10E+03
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05	-
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-	-	7.50E+01
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-	3.50E+01
DDD, p,p'- (DDD)	2.40E-01	I	6.90E-05	C	3.00E-05	X	-	-	1	0.1	1	-	9.00E-02	1.18E+05	-
DDT	3.40E-01	I	9.70E-05	I	5.00E-04	I	-	-	1	0.03	1	-	5.50E-03	1.69E+05	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06	-
Endrin	-	-	-	-	3.00E-04	I	-	-	1	0.1	1	-	2.50E-01	2.01E+04	-
Hexachlorobenzene	1.60E+00	I	4.60E-04	I	8.00E-04	I	-	-	1	-	1	-	6.20E-03	6.20E+03	3.72E+01
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>g</sub> <sup>1</sup> (cm <sup>2</sup> /s)	D <sub>iw</sub> <sup>1</sup> (cm <sup>2</sup> /s)	D <sub>A</sub> <sup>1</sup> (cm <sup>2</sup> /s)
Aldrin	4.40E-05	1.80E-03	PHYSROP	603.01	EPI	627.225	Approx. from Tcrit=1.5xTBoil	PEST	2.28E-02	5.84E-06	4.52E-09
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-
Antimony (metallic)	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-	-	-
Aroclor 1248	4.40E-04	1.80E-02	PHYSROP	613.15	EPI	919.725	Approx. from Tcrit=1.5xTBoil	PCB	2.41E-02	6.18E-06	5.03E-08
Aroclor 1254	2.83E-04	1.16E-02	PHYSROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02	6.10E-06	1.87E-08
Aroclor 1260	3.36E-04	1.37E-02	PHYSROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09
Arsenic, Inorganic	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-	-	-
Barium	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-	-	-
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02	5.56E-06	-
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-
Cadmium (Diet)	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-	-	-
Chromium(III), Insoluble Salts	-	-		-		-		INORGANIC	-	-	-
Chrysene	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	-
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-
Copper	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-	-	-
DDD, p,p'- (DDD)	6.60E-06	2.70E-04	PHYSROP	623.15	PHYSROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02	4.74E-06	-
DDT	8.32E-06	3.40E-04	PHYSROP	533.15	PHYSROP	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02	4.43E-06	-
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02	5.21E-06	-
Endrin	6.36E-06	2.60E-04	PHYSROP	603.15	EPI	-		PEST	3.62E-02	4.22E-06	-
Hexachlorobenzene	1.70E-03	6.95E-02	PHYSROP	598.15	PHYSROP	825	YAWS	PEST	2.90E-02	7.85E-06	2.88E-06
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-		PAH	4.48E-02	5.23E-06	-
Manganese (Non-diet)	-	-		2368.15	PHYSROP	4325	CRC89	INORGANIC	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m³/kg)	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aldrin	1.36E+09	1.72E+06	1.53E-02	3.94E-08	-	1.77E-09	4.12E-08	2.17E-04	-	-	2.17E-04
Aluminum	1.36E+09	-	9.53E+03	-	-	-	-	4.05E-03	-	1.59E-04	4.20E-03
Antimony (metallic)	1.36E+09	-	4.05E+01	-	-	-	-	4.30E-02	-	-	4.30E-02
Aroclor 1248	1.36E+09	5.14E+05	7.49E-01	2.27E-07	1.35E-07	3.37E-08	3.95E-07	-	-	-	-
Aroclor 1254	1.36E+09	8.43E+05	1.08E+00	3.27E-07	1.94E-07	2.96E-08	5.50E-07	2.29E-02	1.35E-02	-	3.64E-02
Aroclor 1260	1.36E+09	1.31E+06	2.84E-01	8.61E-08	5.10E-08	5.00E-09	1.42E-07	-	-	-	-
Arsenic, Inorganic	1.36E+09	-	8.01E+00	1.09E-06	2.31E-07	1.02E-09	1.33E-06	6.80E-03	1.44E-03	4.45E-05	8.29E-03
Barium	1.36E+09	-	1.68E+02	-	-	-	-	3.56E-04	-	2.79E-05	3.84E-04
Benz[a]anthracene	1.36E+09	4.41E+06	2.64E+00	4.00E-08	2.20E-08	1.46E-09	6.35E-08	-	-	-	-
Benzo[a]pyrene	1.36E+09	-	2.23E+00	3.38E-07	1.86E-07	3.98E-11	5.24E-07	3.16E-03	1.74E-03	9.29E-05	4.99E-03
Benzo[b]fluoranthene	1.36E+09	-	2.63E+00	3.99E-08	2.19E-08	4.69E-12	6.18E-08	-	-	-	-
Benzo[k]fluoranthene	1.36E+09	-	1.39E+00	2.11E-09	1.16E-09	2.48E-13	3.27E-09	-	-	-	-
Cadmium (Diet)	1.36E+09	-	4.16E+00	-	-	2.23E-10	2.23E-10	1.77E-03	2.99E-04	3.47E-05	2.10E-03
Chromium(III), Insoluble Salts	1.36E+09	-	4.89E+01	-	-	-	-	1.38E-05	-	-	1.38E-05
Chrysene	1.36E+09	-	2.29E+00	3.47E-10	1.91E-10	4.09E-14	5.38E-10	-	-	-	-
Cobalt	1.36E+09	-	4.44E+00	-	-	1.19E-09	1.19E-09	6.28E-03	-	6.16E-05	6.35E-03
Copper	1.36E+09	-	8.93E+01	-	-	-	-	9.48E-04	-	-	9.48E-04
DDD, p,p'- (DDD)	1.36E+09	-	3.22E+00	1.17E-07	4.96E-08	6.61E-12	1.67E-07	4.56E-02	1.93E-02	-	6.49E-02
DDT	1.36E+09	-	3.48E+00	1.79E-07	2.28E-08	1.00E-11	2.02E-07	2.96E-03	3.75E-04	-	3.33E-03
Dibenz[a,h]anthracene	1.36E+09	-	6.26E-01	9.49E-08	5.22E-08	1.12E-11	1.47E-07	-	-	-	-
Endrin	1.36E+09	-	6.56E-01	-	-	-	-	9.29E-04	3.93E-04	-	1.32E-03
Hexachlorobenzene	1.36E+09	6.80E+04	4.80E-01	1.16E-07	-	1.31E-07	2.48E-07	2.55E-04	-	-	2.55E-04
Indeno[1,2,3-cd]pyrene	1.36E+09	-	1.44E+00	2.18E-08	1.20E-08	2.57E-12	3.39E-08	-	-	-	-
Manganese (Non-diet)	1.36E+09	-	1.16E+03	-	-	-	-	2.06E-02	-	1.94E-03	2.25E-02



# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Phenanthrene	-	-	-	-	-	-	-	-	1	0.13	1	-	1.15E+00	1.67E+04	1.00E+02
Silver	-	-	-	-	5.00E-03	I	-	-	0.04	-	1	-	-	-	8.30E+00
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04	-	-
Vanadium and Compounds	-	-	-	-	5.04E-03	S	1.00E-04	A	0.026	-	1	-	-	-	1.00E+03
Zinc and Compounds	-	-	-	-	3.00E-01	I	-	-	1	-	1	-	-	-	6.20E+01
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>la</sub> (cm <sup>2</sup> /s)	D <sub>iw</sub> (cm <sup>2</sup> /s)	D <sub>A</sub> (cm <sup>2</sup> /s)
Mercury (elemental)	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05
Phenanthrene	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS	PAH	3.45E-02	6.69E-06	3.21E-08
Silver	-	-		2273.15	PHYSPROP	6410	CRC89	INORGANIC	-	-	-
Thallium Sulfate	-	-		-		-		INORGANIC	-	-	-
Vanadium and Compounds	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-	-	-
Zinc and Compounds	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-	-	-
<i>*Total Risk/HI</i>	-	-		-		-			-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Mercury (elemental)	1.36E+09	3.47E+04	4.34E-01	-	-	-	-	-	-	4.72E-03	4.72E-03
Phenanthrene	1.36E+09	6.43E+05	7.09E+00	-	-	-	-	-	-	-	-
Silver	1.36E+09	-	1.71E+00	-	-	-	-	1.45E-04	-	-	1.45E-04
Thallium Sulfate	1.36E+09	-	2.35E+00	-	-	-	-	4.99E-02	-	-	4.99E-02
Vanadium and Compounds	1.36E+09	-	2.01E+01	-	-	-	-	1.69E-03	-	1.67E-05	1.71E-03
Zinc and Compounds	1.36E+09	-	6.44E+02	-	-	-	-	9.11E-04	-	-	9.11E-04
<i>*Total Risk/HI</i>	-	-	-	<i>2.72E-06</i>	<i>9.79E-07</i>	<i>2.05E-07</i>	<i>3.91E-06</i>	<i>2.12E-01</i>	<i>3.71E-02</i>	<i>7.09E-03</i>	<i>2.57E-01</i>

# Site-specific Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
A (PEF Dispersion Constant)	2.4538	2.4538
A <sub>conf</sub> (areal extent of site) m <sup>2</sup>	2023.43	2023.43
B (PEF Dispersion Constant)	17.5660	17.5660
C (PEF Dispersion Constant)	189.0426	189.0426
F <sub>n</sub> Unitless Dispersion Correction Factor	0.185837208	0.185837208
F(x) (function dependant on U <sub>min</sub> /U <sub>i</sub> , derived using Cowherd et al. (1985))	0.194	0.194
M <sub>moist</sub> (Gravimetric soil moisture content) %	7.9	7.9
M <sub>moistav</sub> (Gravimetric soil moisture content) %	12	12
M <sub>wind</sub> (dust emitted by wind erosion) g	51288.84717	51288.84717
N <sub>dump</sub> (number of times soil is dumped)	2	2
N <sub>till</sub> (number of times soil is tilled)	2	2
Q/C <sub>ca</sub> (inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source) g/m <sup>2</sup> -s per kg/m <sup>3</sup>	14.31407	14.31407
p <sub>soil</sub> (density) g/cm <sup>3</sup> - chemical-specific	1.68	1.68
s <sub>soil</sub> (soil silt content) %	6.9	6.9
AF <sub>cw</sub> (skin adherence factor - construction worker) mg/cm <sup>2</sup>	0.3	0.3
AT <sub>cw</sub> (averaging time - construction worker) days	365	365
BW <sub>cw</sub> (body weight - construction worker) kg	80	80
ED <sub>cw</sub> (exposure duration - construction worker) yr	1	1
EF <sub>cw</sub> (exposure frequency - construction worker) day/yr	250	250
ET <sub>cw</sub> (exposure time - construction worker) hr/day	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>cw</sub> (soil ingestion rate - construction worker) mg/day	330	330
LT (lifetime) yr	70	70
SA <sub>cw</sub> (surface area - construction worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
S <sub>doz</sub> (dozing speed) kph	11.4	11.4
S <sub>grade</sub> (grading speed) kph	11.4	11.4
s <sub>till</sub> (soil silt content) %	18	18
t <sub>c</sub> (overall duration of construction) hours	8400	8400

# Site-specific Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
$T_c$ (overall duration of construction) s	30240000	30240000
T (time over which traffic occurs) s	7200000	7200000
$T_t$ (overall duration of traffic) s	7200000	7200000
$U_m$ (mean annual wind speed) m/s	4.69	4.69
$U_t$ (equivalent threshold value) m/s	11.32	11.32
V (fraction of vegetative cover)	0	0

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>0</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Aldrin	309-00-2	No	Yes	Organics	1.70E+01	I	4.90E-03	I	4.00E-05	P /Subchronic	-		1	-
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	P /Subchronic	-		0.15	-
Aroclor 1248	12672-29-6	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14
Aroclor 1254	11097-69-1	No	Yes	Organics	2.00E+00	S	5.71E-04	S	3.00E-05	A /Subchronic	-		1	0.14
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I /Chronic	2.00E-06	I /Chronic	1	0.13
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	5.00E-04	A /Subchronic	1.00E-05	A /Chronic	0.025	0.001
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-

# Site-specific

## Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> (cm <sup>2</sup> /s)
1	-	1.70E-02	8.20E+04	4.92E+02	4.40E-05	1.80E-03	PHYSROP	603.01	EPI	627.225	Approx. from Tcrit=1.5xTBoil	PEST	2.28E-02
1	-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
1	-	-	-	4.50E+01	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-
1	-	1.00E-01	7.65E+04	4.59E+02	4.40E-04	1.80E-02	PHYSROP	613.15	EPI	919.725	Approx. from Tcrit=1.5xTBoil	PCB	2.41E-02
1	-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02
1	-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02
0.6	-	-	-	2.90E+01	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-
1	-	-	-	4.10E+01	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-
1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02
1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02
1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02
1	-	-	-	7.50E+01	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-
1	-	-	-	1.80E+06	-	-		-		-		INORGANIC	-

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
5.84E-06	4.52E-09	3.61E+07	3.72E+05	1.46E+00	-	2.31E+01	1.37E+00	1.36E+00	-	-	1.36E+00	1.36E+00 nc
-	-	3.61E+07	-	-	-	-	-	3.39E+04	-	7.58E+04	2.34E+04	2.34E+04 nc
-	-	3.61E+07	-	-	-	-	-	1.36E+01	-	-	1.36E+01	1.36E+01 nc
6.18E-06	5.03E-08	3.61E+07	1.12E+05	1.24E+01	2.76E+01	5.97E+01	7.48E+00	-	-	-	-	7.48E+00 ca
6.10E-06	1.87E-08	3.61E+07	1.83E+05	1.24E+01	2.76E+01	9.76E+01	7.86E+00	1.02E+00	2.27E+00	-	7.03E-01	7.03E-01 nc
5.61E-06	7.70E-09	3.61E+07	2.85E+05	1.24E+01	2.76E+01	1.52E+02	8.09E+00	-	-	-	-	8.09E+00 ca
-	-	3.61E+07	-	2.75E+01	1.72E+02	2.57E+03	2.35E+01	1.70E+01	1.06E+02	2.27E+02	1.37E+01	1.37E+01 nc
-	-	3.61E+07	-	-	-	-	-	6.79E+03	-	7.58E+04	6.23E+03	6.23E+03 nc
6.75E-06	6.83E-10	3.61E+07	9.57E+05	2.48E+02	5.94E+02	4.76E+03	1.69E+02	-	-	-	-	1.69E+02 ca
5.56E-06	-	3.61E+07	-	2.48E+01	5.94E+01	1.84E+04	1.75E+01	1.02E+01	2.44E+01	3.03E+01	5.81E+00	5.81E+00 nc
5.56E-06	-	3.61E+07	-	2.48E+02	5.94E+02	1.84E+05	1.75E+02	-	-	-	-	1.75E+02 ca
5.56E-06	-	3.61E+07	-	2.48E+03	5.94E+03	1.84E+06	1.75E+03	-	-	-	-	1.75E+03 ca
-	-	3.61E+07	-	-	-	6.15E+03	6.15E+03	1.70E+01	1.32E+02	1.52E+02	1.37E+01	1.37E+01 nc
-	-	3.61E+07	-	-	-	-	-	5.09E+04	-	7.58E+04	3.05E+04	3.05E+04 nc



# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-
Copper	7440-50-8	No	No	Inorganics	-		-		1.00E-02	A /Subchronic	-		1	-
DDD, p,p`- (DDD)	72-54-8	No	No	Organics	2.40E-01	I	6.90E-05	C	3.00E-05	X /Subchronic	-		1	0.1
DDT	50-29-3	No	No	Organics	3.40E-01	I	9.70E-05	I	5.00E-04	A /Subchronic	-		1	0.03
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13
Endrin	72-20-8	No	No	Organics	-		-		3.00E-04	H /Subchronic	-		1	0.1
Hexachlorobenzene	118-74-1	No	Yes	Organics	1.60E+00	I	4.60E-04	I	1.00E-05	P /Subchronic	-		1	-
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S /Chronic	5.00E-05	I /Chronic	0.04	-
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	H /Subchronic	1	-
Phenanthrene	85-01-8	No	Yes	Organics	-		-		-		-		1	0.13
Silver	7440-22-4	No	No	Inorganics	-		-		5.00E-03	H /Subchronic	-		0.04	-
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		5.00E-05	X /Subchronic	-		1	-

# Site-specific

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RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> (cm <sup>2</sup> /s)
1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
1	-	-	-	3.50E+01	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-
1	-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSROP	623.15	PHYSROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02
1	-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSROP	533.15	PHYSROP	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02
1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02
1	-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSROP	603.15	EPI	-		PEST	3.62E-02
1	-	6.20E-03	6.20E+03	3.72E+01	1.70E-03	6.95E-02	PHYSROP	598.15	PHYSROP	825	YAWS	PEST	2.90E-02
1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-		PAH	4.48E-02
1	-	-	-	6.50E+01	-	-		2368.15	PHYSROP	4325	CRC89	INORGANIC	-
1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP	1764	CRC89	INORGANIC	3.07E-02
1	-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSROP	613.15	PHYSROP	869	YAWS	PAH	3.45E-02
1	-	-	-	8.30E+00	-	-		2273.15	PHYSROP	6410	CRC89	INORGANIC	-
1	-	5.47E+04	-	-	-	-		-		-		INORGANIC	-

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

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$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
6.75E-06	-	3.61E+07	-	2.48E+04	5.94E+04	1.84E+07	1.75E+04	-	-	-	-	1.75E+04 ca
-	-	3.61E+07	-	-	-	1.23E+03	1.23E+03	1.02E+02	-	3.03E+02	7.62E+01	7.62E+01 nc
-	-	3.61E+07	-	-	-	-	-	3.39E+02	-	-	3.39E+02	3.39E+02 nc
4.74E-06	-	3.61E+07	-	1.03E+02	3.22E+02	1.60E+05	7.81E+01	1.02E+00	3.18E+00	-	7.71E-01	7.71E-01 nc
4.43E-06	-	3.61E+07	-	7.29E+01	7.58E+02	1.14E+05	6.64E+01	1.70E+01	1.76E+02	-	1.55E+01	1.55E+01 nc
5.21E-06	-	3.61E+07	-	2.48E+01	5.94E+01	1.84E+04	1.75E+01	-	-	-	-	1.75E+01 ca
4.22E-06	-	3.61E+07	-	-	-	-	-	1.02E+01	3.18E+01	-	7.71E+00	7.71E+00 nc
7.85E-06	2.88E-06	3.61E+07	1.47E+04	1.55E+01	-	9.82E+00	6.01E+00	3.39E-01	-	-	3.39E-01	3.39E-01 nc
5.23E-06	-	3.61E+07	-	2.48E+02	5.94E+02	1.84E+05	1.75E+02	-	-	-	-	1.75E+02 ca
-	-	3.61E+07	-	-	-	-	-	8.15E+02	-	7.58E+02	3.93E+02	3.93E+02 nc
6.30E-06	1.10E-05	3.61E+07	7.53E+03	-	-	-	-	-	-	9.49E-01	9.49E-01	9.49E-01 nc
6.69E-06	3.21E-08	3.61E+07	1.40E+05	-	-	-	-	-	-	-	-	
-	-	3.61E+07	-	-	-	-	-	1.70E+02	-	-	1.70E+02	1.70E+02 nc
-	-	3.61E+07	-	-	-	-	-	1.70E+00	-	-	1.70E+00	1.70E+00 nc

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# Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		-		1.00E-02	A /Subchronic	1.00E-04	A /Chronic	0.026	-
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	A /Subchronic	-		1	-

# Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

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RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> (cm <sup>2</sup> /s)
1	-	-	-	1.00E+03	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-
1	-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $cm^2/s$ )	$D_A$ ( $cm^2/s$ )	Particulate Emission Factor ( $m^3/kg$ )	Volatilization Factor ( $m^3/kg$ )	Ingestion SL TR=1E-06 ( $mg/kg$ )	Dermal SL TR=1E-06 ( $mg/kg$ )	Inhalation SL TR=1E-06 ( $mg/kg$ )	Carcinogenic SL TR=1E-06 ( $mg/kg$ )	Ingestion SL THQ=0.1 ( $mg/kg$ )	Dermal SL THQ=0.1 ( $mg/kg$ )	Inhalation SL THQ=0.1 ( $mg/kg$ )	Noncarcinogenic SL THI=0.1 ( $mg/kg$ )	Screening Level ( $mg/kg$ )
-	-	3.61E+07	-	-	-	-	-	3.39E+02	-	1.52E+03	2.77E+02	2.77E+02 nc
-	-	3.61E+07	-	-	-	-	-	1.02E+04	-	-	1.02E+04	1.02E+04 nc

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aldrin	1.70E+01	I	4.90E-03	I	4.00E-05	P /Subchronic	-	-	1	-	1
Aluminum	-	-	-	-	1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-	1
Antimony (metallic)	-	-	-	-	4.00E-04	P /Subchronic	-	-	0.15	-	1
Aroclor 1248	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1
Aroclor 1254	2.00E+00	S	5.71E-04	S	3.00E-05	A /Subchronic	-	-	1	0.14	1
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03	0.6
Barium	-	-	-	-	2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-	1
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I /Chronic	2.00E-06	I /Chronic	1	0.13	1
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1
Cadmium (Diet)	-	-	1.80E-03	I	5.00E-04	A /Subchronic	1.00E-05	A /Chronic	0.025	0.001	1
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-	1
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1
Cobalt	-	-	9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-	1
Copper	-	-	-	-	1.00E-02	A /Subchronic	-	-	1	-	1
DDD, p,p`- (DDD)	2.40E-01	I	6.90E-05	C	3.00E-05	X /Subchronic	-	-	1	0.1	1
DDT	3.40E-01	I	9.70E-05	I	5.00E-04	A /Subchronic	-	-	1	0.03	1
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1
Endrin	-	-	-	-	3.00E-04	H /Subchronic	-	-	1	0.1	1
Hexachlorobenzene	1.60E+00	I	4.60E-04	I	1.00E-05	P /Subchronic	-	-	1	-	1
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1
Manganese (Non-diet)	-	-	-	-	2.40E-02	S /Chronic	5.00E-05	I /Chronic	0.04	-	1
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	H /Subchronic	1	-	1
Phenanthrene	-	-	-	-	-	-	-	-	1	0.13	1
Silver	-	-	-	-	5.00E-03	H /Subchronic	-	-	0.04	-	1
Thallium Sulfate	-	-	-	-	5.00E-05	X /Subchronic	-	-	1	-	1
Vanadium and Compounds	-	-	-	-	1.00E-02	A /Subchronic	1.00E-04	A /Chronic	0.026	-	1

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>o</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref
Aldrin	-	1.70E-02	8.20E+04	4.92E+02	4.40E-05	1.80E-03	PHYSPROP	603.01	EPI
Aluminum	-	-	-	1.50E+03	-	-	-	2792.15	CRC89
Antimony (metallic)	-	-	-	4.50E+01	-	-	-	1908.15	PHYSPROP
Aroclor 1248	-	1.00E-01	7.65E+04	4.59E+02	4.40E-04	1.80E-02	PHYSPROP	613.15	EPI
Aroclor 1254	-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI
Aroclor 1260	-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI
Arsenic, Inorganic	-	-	-	2.90E+01	-	-	-	888.15	PHYSPROP
Barium	-	-	-	4.10E+01	-	-	-	1873.15	PHYSPROP
Benz[a]anthracene	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP
Benzo[a]pyrene	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP
Benzo[b]fluoranthene	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI
Benzo[k]fluoranthene	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP
Cadmium (Diet)	-	-	-	7.50E+01	-	-	-	1038.15	PHYSPROP
Chromium(III), Insoluble Salts	-	-	-	1.80E+06	-	-	-	-	-
Chrysene	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP
Cobalt	-	-	-	4.50E+01	-	-	-	3200.15	CRC89
Copper	-	-	-	3.50E+01	-	-	-	2868.15	PHYSPROP
DDD, p,p'- (DDD)	-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP
DDT	-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP
Dibenz[a,h]anthracene	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP
Endrin	-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI
Hexachlorobenzene	-	6.20E-03	6.20E+03	3.72E+01	1.70E-03	6.95E-02	PHYSPROP	598.15	PHYSPROP
Indeno[1,2,3-cd]pyrene	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP
Manganese (Non-diet)	-	-	-	6.50E+01	-	-	-	2368.15	PHYSPROP
Mercury (elemental)	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP
Phenanthrene	-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP
Silver	-	-	-	8.30E+00	-	-	-	2273.15	PHYSPROP
Thallium Sulfate	-	5.47E+04	-	-	-	-	-	-	-
Vanadium and Compounds	-	-	-	1.00E+03	-	-	-	3680.15	CRC89



# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> (cm <sup>2</sup> /s)	D <sub>iw</sub> (cm <sup>2</sup> /s)	D <sub>A</sub> (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)
Aldrin	627.225	Approx. from Tcrit=1.5xTBoil	PEST	2.28E-02	5.84E-06	4.52E-09	3.61E+07	3.72E+05
Aluminum	6700	CRC89	INORGANIC	-	-	-	3.61E+07	-
Antimony (metallic)	5070	YAWS	INORGANIC	-	-	-	3.61E+07	-
Aroclor 1248	919.725	Approx. from Tcrit=1.5xTBoil	PCB	2.41E-02	6.18E-06	5.03E-08	3.61E+07	1.12E+05
Aroclor 1254	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02	6.10E-06	1.87E-08	3.61E+07	1.83E+05
Aroclor 1260	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09	3.61E+07	2.85E+05
Arsenic, Inorganic	1673	CRC89	INORGANIC	-	-	-	3.61E+07	-
Barium	3572.13	YAWS	INORGANIC	-	-	-	3.61E+07	-
Benz[a]anthracene	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	3.61E+07	9.57E+05
Benzo[a]pyrene	-	-	PAH	4.76E-02	5.56E-06	-	3.61E+07	-
Benzo[b]fluoranthene	-	-	PAH	4.76E-02	5.56E-06	-	3.61E+07	-
Benzo[k]fluoranthene	-	-	PAH	4.76E-02	5.56E-06	-	3.61E+07	-
Cadmium (Diet)	2291	YAWS	INORGANIC	-	-	-	3.61E+07	-
Chromium(III), Insoluble Salts	-	-	INORGANIC	-	-	-	3.61E+07	-
Chrysene	979	YAWS	PAH	2.61E-02	6.75E-06	-	3.61E+07	-
Cobalt	7398.48	YAWS	INORGANIC	-	-	-	3.61E+07	-
Copper	5123	YAWS	INORGANIC	-	-	-	3.61E+07	-
DDD, p,p`- (DDD)	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02	4.74E-06	-	3.61E+07	-
DDT	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02	4.43E-06	-	3.61E+07	-
Dibenz[a,h]anthracene	-	-	PAH	4.46E-02	5.21E-06	-	3.61E+07	-
Endrin	-	-	PEST	3.62E-02	4.22E-06	-	3.61E+07	-
Hexachlorobenzene	825	YAWS	PEST	2.90E-02	7.85E-06	2.88E-06	3.61E+07	1.47E+04
Indeno[1,2,3-cd]pyrene	-	-	PAH	4.48E-02	5.23E-06	-	3.61E+07	-
Manganese (Non-diet)	4325	CRC89	INORGANIC	-	-	-	3.61E+07	-
Mercury (elemental)	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	3.61E+07	7.53E+03
Phenanthrene	869	YAWS	PAH	3.45E-02	6.69E-06	3.21E-08	3.61E+07	1.40E+05
Silver	6410	CRC89	INORGANIC	-	-	-	3.61E+07	-
Thallium Sulfate	-	-	INORGANIC	-	-	-	3.61E+07	-
Vanadium and Compounds	11325	YAWS	INORGANIC	-	-	-	3.61E+07	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aldrin	1.53E-02	1.05E-08	-	6.64E-10	1.12E-08	1.13E-03	-	-	1.13E-03
Aluminum	9.53E+03	-	-	-	-	2.81E-02	-	1.26E-02	4.06E-02
Antimony (metallic)	4.05E+01	-	-	-	-	2.98E-01	-	-	2.98E-01
Aroclor 1248	7.49E-01	6.05E-08	2.71E-08	1.26E-08	1.00E-07	-	-	-	-
Aroclor 1254	1.08E+00	8.69E-08	3.90E-08	1.10E-08	1.37E-07	1.06E-01	4.75E-02	-	1.53E-01
Aroclor 1260	2.84E-01	2.29E-08	1.03E-08	1.87E-09	3.51E-08	-	-	-	-
Arsenic, Inorganic	8.01E+00	2.91E-07	4.66E-08	3.11E-09	3.41E-07	4.72E-02	7.57E-03	3.52E-03	5.83E-02
Barium	1.68E+02	-	-	-	-	2.47E-03	-	2.21E-04	2.69E-03
Benz[a]anthracene	2.64E+00	1.07E-08	4.44E-09	5.54E-10	1.57E-08	-	-	-	-
Benzo[a]pyrene	2.23E+00	9.00E-08	3.75E-08	1.21E-10	1.28E-07	2.19E-02	9.13E-03	7.35E-03	3.84E-02
Benzo[b]fluoranthene	2.63E+00	1.06E-08	4.42E-09	1.43E-11	1.51E-08	-	-	-	-
Benzo[k]fluoranthene	1.39E+00	5.61E-10	2.34E-10	7.54E-13	7.96E-10	-	-	-	-
Cadmium (Diet)	4.16E+00	-	-	6.77E-10	6.77E-10	2.45E-02	3.14E-03	2.74E-03	3.04E-02
Chromium(III), Insoluble Salts	4.89E+01	-	-	-	-	9.61E-05	-	6.45E-05	1.61E-04
Chrysene	2.29E+00	9.24E-11	3.85E-11	1.24E-13	1.31E-10	-	-	-	-
Cobalt	4.44E+00	-	-	3.61E-09	3.61E-09	4.36E-03	-	1.46E-03	5.82E-03
Copper	8.93E+01	-	-	-	-	2.63E-02	-	-	2.63E-02
DDD, p,p`- (DDD)	3.22E+00	3.12E-08	1.00E-08	2.01E-11	4.12E-08	3.16E-01	1.01E-01	-	4.18E-01
DDT	3.48E+00	4.78E-08	4.59E-09	3.05E-11	5.24E-08	2.05E-02	1.97E-03	-	2.25E-02
Dibenz[a,h]anthracene	6.26E-01	2.53E-08	1.05E-08	3.39E-11	3.58E-08	-	-	-	-
Endrin	6.56E-01	-	-	-	-	6.44E-03	2.07E-03	-	8.51E-03
Hexachlorobenzene	4.80E-01	3.10E-08	-	4.89E-08	7.99E-08	1.41E-01	-	-	1.41E-01
Indeno[1,2,3-cd]pyrene	1.44E+00	5.81E-09	2.42E-09	7.81E-12	8.24E-09	-	-	-	-
Manganese (Non-diet)	1.16E+03	-	-	-	-	1.43E-01	-	1.53E-01	2.96E-01
Mercury (elemental)	4.34E-01	-	-	-	-	-	-	4.57E-02	4.57E-02
Phenanthrene	7.09E+00	-	-	-	-	-	-	-	-
Silver	1.71E+00	-	-	-	-	1.01E-03	-	-	1.01E-03
Thallium Sulfate	2.35E+00	-	-	-	-	1.38E-01	-	-	1.38E-01
Vanadium and Compounds	2.01E+01	-	-	-	-	5.91E-03	-	1.32E-03	7.23E-03

# Construction Worker Risk for Soil - Other Construction Activities

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Zinc and Compounds	-		-		3.00E-01	A /Subchronic	-		1	-	1
<i>*Total Risk/HI</i>	-		-		-		-		-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>o</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref
Zinc and Compounds	-	-	-	6.20E+01	-	-	-	1181.15	PHYSPROP
<i>*Total Risk/HL</i>	-	-	-	-	-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia}$ (cm <sup>2</sup> /s)	$D_{iw}$ (cm <sup>2</sup> /s)	$D_A$ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)
Zinc and Compounds	3170	YAWS	INORGANIC	-	-	-	3.61E+07	-
<i>*Total Risk/HI</i>	-			-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Zinc and Compounds	6.44E+02	-	-	-	-	6.32E-03	-	-	6.32E-03
<i>*Total Risk/HI</i>	-	<i>7.25E-07</i>	<i>1.97E-07</i>	<i>8.32E-08</i>	<i>1.01E-06</i>	<i>1.34E+00</i>	<i>1.73E-01</i>	<i>2.28E-01</i>	<i>1.74E+00</i>

	A	B	C	D	E	F	G	H	I	J	K	L	
1	<b>UCL Statistics for Data Sets with Non-Detects</b>												
2													
3	User Selected Options												
4	Date/Time of Computation		ProUCL 5.12/12/2020 1:44:44 PM										
5	From File		Area D_ss_wocov_prouclin.xls										
6	Full Precision		OFF										
7	Confidence Coefficient		95%										
8	Number of Bootstrap Operations		2000										
9													
10													
11	<b>Aluminum</b>												
12													
13	<b>General Statistics</b>												
14	Total Number of Observations				35		Number of Distinct Observations				35		
15									Number of Missing Observations				0
16	Minimum				3390		Mean				9110		
17	Maximum				23000		Median				8500		
18	SD				4192		Std. Error of Mean				708.6		
19	Coefficient of Variation				0.46		Skewness				1.668		
20													
21	<b>Normal GOF Test</b>												
22	Shapiro Wilk Test Statistic				0.849		<b>Shapiro Wilk GOF Test</b>						
23	5% Shapiro Wilk Critical Value				0.934		Data Not Normal at 5% Significance Level						
24	Lilliefors Test Statistic				0.134		<b>Lilliefors GOF Test</b>						
25	5% Lilliefors Critical Value				0.148		Data appear Normal at 5% Significance Level						
26	<b>Data appear Approximate Normal at 5% Significance Level</b>												
27													
28	<b>Assuming Normal Distribution</b>												
29	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
30	95% Student's-t UCL				10308		95% Adjusted-CLT UCL (Chen-1995)				10489		
31									95% Modified-t UCL (Johnson-1978)				10341
32													
33	<b>Gamma GOF Test</b>												
34	A-D Test Statistic				0.677		<b>Anderson-Darling Gamma GOF Test</b>						
35	5% A-D Critical Value				0.749		Detected data appear Gamma Distributed at 5% Significance Level						
36	K-S Test Statistic				0.115		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
37	5% K-S Critical Value				0.149		Detected data appear Gamma Distributed at 5% Significance Level						
38	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
39													
40	<b>Gamma Statistics</b>												
41	k hat (MLE)				5.953		k star (bias corrected MLE)				5.462		
42	Theta hat (MLE)				1530		Theta star (bias corrected MLE)				1668		
43	nu hat (MLE)				416.7		nu star (bias corrected)				382.3		
44	MLE Mean (bias corrected)				9110		MLE Sd (bias corrected)				3898		
45									Approximate Chi Square Value (0.05)				338
46	Adjusted Level of Significance				0.0425		Adjusted Chi Square Value				336		
47													
48	<b>Assuming Gamma Distribution</b>												
49	95% Approximate Gamma UCL (use when n>=50))				10305		95% Adjusted Gamma UCL (use when n<50)				10365		
50													
51	<b>Lognormal GOF Test</b>												
52	Shapiro Wilk Test Statistic				0.966		<b>Shapiro Wilk Lognormal GOF Test</b>						
53	5% Shapiro Wilk Critical Value				0.934		Data appear Lognormal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
54	Lilliefors Test Statistic					0.11	Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data					8.129	Mean of logged Data					9.031
60	Maximum of Logged Data					10.04	SD of logged Data					0.411
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL					10380	90% Chebyshev (MVUE) UCL					11021
64	95% Chebyshev (MVUE) UCL					11905	97.5% Chebyshev (MVUE) UCL					13132
65	99% Chebyshev (MVUE) UCL					15541						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL					10276	95% Jackknife UCL					10308
72	95% Standard Bootstrap UCL					10250	95% Bootstrap-t UCL					10626
73	95% Hall's Bootstrap UCL					10895	95% Percentile Bootstrap UCL					10324
74	95% BCA Bootstrap UCL					10509						
75	90% Chebyshev(Mean, Sd) UCL					11236	95% Chebyshev(Mean, Sd) UCL					12199
76	97.5% Chebyshev(Mean, Sd) UCL					13535	99% Chebyshev(Mean, Sd) UCL					16161
77												
78	Suggested UCL to Use											
79	95% Student's-t UCL					10308						
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												
89												
90	Antimony											
91												
92	General Statistics											
93	Total Number of Observations					9	Number of Distinct Observations					9
94							Number of Missing Observations					0
95	Minimum					1.2	Mean					2.311
96	Maximum					4.1	Median					2.2
97	SD					0.949	Std. Error of Mean					0.316
98	Coefficient of Variation					0.411	Skewness					0.811
99												
100	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
101	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
102	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
103	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
104												
105	Normal GOF Test											
106	Shapiro Wilk Test Statistic					0.934	Shapiro Wilk GOF Test					



	A	B	C	D	E	F	G	H	I	J	K	L
107	5% Shapiro Wilk Critical Value					0.829	Data appear Normal at 5% Significance Level					
108	Lilliefors Test Statistic					0.185	Lilliefors GOF Test					
109	5% Lilliefors Critical Value					0.274	Data appear Normal at 5% Significance Level					
110	Data appear Normal at 5% Significance Level											
111												
112	Assuming Normal Distribution											
113	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
114	95% Student's-t UCL					2.9	95% Adjusted-CLT UCL (Chen-1995)					2.923
115							95% Modified-t UCL (Johnson-1978)					2.914
116												
117	Gamma GOF Test											
118	A-D Test Statistic					0.218	Anderson-Darling Gamma GOF Test					
119	5% A-D Critical Value					0.722	Detected data appear Gamma Distributed at 5% Significance Level					
120	K-S Test Statistic					0.186	Kolmogorov-Smirnov Gamma GOF Test					
121	5% K-S Critical Value					0.28	Detected data appear Gamma Distributed at 5% Significance Level					
122	Detected data appear Gamma Distributed at 5% Significance Level											
123												
124	Gamma Statistics											
125	k hat (MLE)					7.057	k star (bias corrected MLE)					4.779
126	Theta hat (MLE)					0.327	Theta star (bias corrected MLE)					0.484
127	nu hat (MLE)					127	nu star (bias corrected)					86.02
128	MLE Mean (bias corrected)					2.311	MLE Sd (bias corrected)					1.057
129							Approximate Chi Square Value (0.05)					65.64
130	Adjusted Level of Significance					0.0231	Adjusted Chi Square Value					61.9
131												
132	Assuming Gamma Distribution											
133	95% Approximate Gamma UCL (use when n>=50))					3.029	95% Adjusted Gamma UCL (use when n<50)					3.212
134												
135	Lognormal GOF Test											
136	Shapiro Wilk Test Statistic					0.973	Shapiro Wilk Lognormal GOF Test					
137	5% Shapiro Wilk Critical Value					0.829	Data appear Lognormal at 5% Significance Level					
138	Lilliefors Test Statistic					0.165	Lilliefors Lognormal GOF Test					
139	5% Lilliefors Critical Value					0.274	Data appear Lognormal at 5% Significance Level					
140	Data appear Lognormal at 5% Significance Level											
141												
142	Lognormal Statistics											
143	Minimum of Logged Data					0.182	Mean of logged Data					0.765
144	Maximum of Logged Data					1.411	SD of logged Data					0.402
145												
146	Assuming Lognormal Distribution											
147	95% H-UCL					3.158	90% Chebyshev (MVUE) UCL					3.246
148	95% Chebyshev (MVUE) UCL					3.671	97.5% Chebyshev (MVUE) UCL					4.261
149	99% Chebyshev (MVUE) UCL					5.419						
150												
151	Nonparametric Distribution Free UCL Statistics											
152	Data appear to follow a Discernible Distribution at 5% Significance Level											
153												
154	Nonparametric Distribution Free UCLs											
155	95% CLT UCL					2.832	95% Jackknife UCL					2.9
156	95% Standard Bootstrap UCL					2.799	95% Bootstrap-t UCL					3.006
157	95% Hall's Bootstrap UCL					3.071	95% Percentile Bootstrap UCL					2.822
158	95% BCA Bootstrap UCL					2.944						
159	90% Chebyshev(Mean, Sd) UCL					3.26	95% Chebyshev(Mean, Sd) UCL					3.69

	A	B	C	D	E	F	G	H	I	J	K	L
160	97.5% Chebyshev(Mean, Sd) UCL					4.287	99% Chebyshev(Mean, Sd) UCL					5.459
161												
162	<b>Suggested UCL to Use</b>											
163	95% Student's-t UCL					2.9						
164												
165	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
166	Recommendations are based upon data size, data distribution, and skewness.											
167	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
168	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
169												
170												
171	<b>Arsenic</b>											
172												
173	<b>General Statistics</b>											
174	Total Number of Observations					35	Number of Distinct Observations					29
175							Number of Missing Observations					0
176	Minimum					3.2	Mean					7.294
177	Maximum					19.5	Median					5.8
178	SD					4.344	Std. Error of Mean					0.734
179	Coefficient of Variation					0.595	Skewness					1.686
180												
181	<b>Normal GOF Test</b>											
182	Shapiro Wilk Test Statistic					0.779	<b>Shapiro Wilk GOF Test</b>					
183	5% Shapiro Wilk Critical Value					0.934	Data Not Normal at 5% Significance Level					
184	Lilliefors Test Statistic					0.225	<b>Lilliefors GOF Test</b>					
185	5% Lilliefors Critical Value					0.148	Data Not Normal at 5% Significance Level					
186	<b>Data Not Normal at 5% Significance Level</b>											
187												
188	<b>Assuming Normal Distribution</b>											
189	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
190	95% Student's-t UCL					8.536	95% Adjusted-CLT UCL (Chen-1995)					8.726
191							95% Modified-t UCL (Johnson-1978)					8.571
192												
193	<b>Gamma GOF Test</b>											
194	A-D Test Statistic					1.346	<b>Anderson-Darling Gamma GOF Test</b>					
195	5% A-D Critical Value					0.753	Data Not Gamma Distributed at 5% Significance Level					
196	K-S Test Statistic					0.164	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
197	5% K-S Critical Value					0.149	Data Not Gamma Distributed at 5% Significance Level					
198	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
199												
200	<b>Gamma Statistics</b>											
201	k hat (MLE)					3.922	k star (bias corrected MLE)					3.605
202	Theta hat (MLE)					1.86	Theta star (bias corrected MLE)					2.023
203	nu hat (MLE)					274.6	nu star (bias corrected)					252.4
204	MLE Mean (bias corrected)					7.294	MLE Sd (bias corrected)					3.842
205							Approximate Chi Square Value (0.05)					216.6
206	Adjusted Level of Significance					0.0425	Adjusted Chi Square Value					215
207												
208	<b>Assuming Gamma Distribution</b>											
209	95% Approximate Gamma UCL (use when n>=50))					8.499	95% Adjusted Gamma UCL (use when n<50)					8.561
210												
211	<b>Lognormal GOF Test</b>											
212	Shapiro Wilk Test Statistic					0.921	<b>Shapiro Wilk Lognormal GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
213	5% Shapiro Wilk Critical Value					0.934	Data Not Lognormal at 5% Significance Level					
214	Lilliefors Test Statistic					0.135	Lilliefors Lognormal GOF Test					
215	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
216	Data appear Approximate Lognormal at 5% Significance Level											
217												
218	Lognormal Statistics											
219	Minimum of Logged Data					1.163	Mean of logged Data					1.854
220	Maximum of Logged Data					2.97	SD of logged Data					0.496
221												
222	Assuming Lognormal Distribution											
223	95% H-UCL					8.516	90% Chebyshev (MVUE) UCL					9.084
224	95% Chebyshev (MVUE) UCL					9.94	97.5% Chebyshev (MVUE) UCL					11.13
225	99% Chebyshev (MVUE) UCL					13.46						
226												
227	Nonparametric Distribution Free UCL Statistics											
228	Data appear to follow a Discernible Distribution at 5% Significance Level											
229												
230	Nonparametric Distribution Free UCLs											
231	95% CLT UCL					8.502	95% Jackknife UCL					8.536
232	95% Standard Bootstrap UCL					8.495	95% Bootstrap-t UCL					8.874
233	95% Hall's Bootstrap UCL					8.779	95% Percentile Bootstrap UCL					8.52
234	95% BCA Bootstrap UCL					8.697						
235	90% Chebyshev(Mean, Sd) UCL					9.497	95% Chebyshev(Mean, Sd) UCL					10.49
236	97.5% Chebyshev(Mean, Sd) UCL					11.88	99% Chebyshev(Mean, Sd) UCL					14.6
237												
238	Suggested UCL to Use											
239	95% Student's-t UCL					8.536	or 95% Modified-t UCL					8.571
240	or 95% H-UCL					8.516						
241												
242	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
243	Recommendations are based upon data size, data distribution, and skewness.											
244	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
245	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
246												
247	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
248	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
249	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
250	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
251												
252												
253	Barium											
254												
255	General Statistics											
256	Total Number of Observations					35	Number of Distinct Observations					35
257							Number of Missing Observations					0
258	Minimum					39.3	Mean					125.2
259	Maximum					427	Median					89.8
260	SD					94.52	Std. Error of Mean					15.98
261	Coefficient of Variation					0.755	Skewness					1.878
262												
263	Normal GOF Test											
264	Shapiro Wilk Test Statistic					0.77	Shapiro Wilk GOF Test					
265	5% Shapiro Wilk Critical Value					0.934	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
266	Lilliefors Test Statistic					0.209	Lilliefors GOF Test					
267	5% Lilliefors Critical Value					0.148	Data Not Normal at 5% Significance Level					
268	Data Not Normal at 5% Significance Level											
269												
270	Assuming Normal Distribution											
271	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
272	95% Student's-t UCL					152.2	95% Adjusted-CLT UCL (Chen-1995)					156.9
273							95% Modified-t UCL (Johnson-1978)					153
274												
275	Gamma GOF Test											
276	A-D Test Statistic					0.985	Anderson-Darling Gamma GOF Test					
277	5% A-D Critical Value					0.757	Data Not Gamma Distributed at 5% Significance Level					
278	K-S Test Statistic					0.134	Kolmogorov-Smirnov Gamma GOF Test					
279	5% K-S Critical Value					0.15	Detected data appear Gamma Distributed at 5% Significance Level					
280	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
281												
282	Gamma Statistics											
283	k hat (MLE)					2.524	k star (bias corrected MLE)					2.327
284	Theta hat (MLE)					49.58	Theta star (bias corrected MLE)					53.79
285	nu hat (MLE)					176.7	nu star (bias corrected)					162.9
286	MLE Mean (bias corrected)					125.2	MLE Sd (bias corrected)					82.05
287							Approximate Chi Square Value (0.05)					134.4
288	Adjusted Level of Significance					0.0425	Adjusted Chi Square Value					133.1
289												
290	Assuming Gamma Distribution											
291	95% Approximate Gamma UCL (use when n>=50)					151.7	95% Adjusted Gamma UCL (use when n<50)					153.1
292												
293	Lognormal GOF Test											
294	Shapiro Wilk Test Statistic					0.947	Shapiro Wilk Lognormal GOF Test					
295	5% Shapiro Wilk Critical Value					0.934	Data appear Lognormal at 5% Significance Level					
296	Lilliefors Test Statistic					0.105	Lilliefors Lognormal GOF Test					
297	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
298	Data appear Lognormal at 5% Significance Level											
299												
300	Lognormal Statistics											
301	Minimum of Logged Data					3.671	Mean of logged Data					4.619
302	Maximum of Logged Data					6.057	SD of logged Data					0.63
303												
304	Assuming Lognormal Distribution											
305	95% H-UCL					154.3	90% Chebyshev (MVUE) UCL					164.8
306	95% Chebyshev (MVUE) UCL					183.8	97.5% Chebyshev (MVUE) UCL					210.2
307	99% Chebyshev (MVUE) UCL					262						
308												
309	Nonparametric Distribution Free UCL Statistics											
310	Data appear to follow a Discernible Distribution at 5% Significance Level											
311												
312	Nonparametric Distribution Free UCLs											
313	95% CLT UCL					151.4	95% Jackknife UCL					152.2
314	95% Standard Bootstrap UCL					151.4	95% Bootstrap-t UCL					160.6
315	95% Hall's Bootstrap UCL					157.6	95% Percentile Bootstrap UCL					152.5
316	95% BCA Bootstrap UCL					159						
317	90% Chebyshev(Mean, Sd) UCL					173.1	95% Chebyshev(Mean, Sd) UCL					194.8
318	97.5% Chebyshev(Mean, Sd) UCL					224.9	99% Chebyshev(Mean, Sd) UCL					284.1

	A	B	C	D	E	F	G	H	I	J	K	L		
319														
320	<b>Suggested UCL to Use</b>													
321	95% Adjusted Gamma UCL					153.1								
322														
323	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test													
324	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL													
325														
326	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.													
327	Recommendations are based upon data size, data distribution, and skewness.													
328	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).													
329	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.													
330														
331														
332	<b>Cadmium</b>													
333														
334	<b>General Statistics</b>													
335	Total Number of Observations				35		Number of Distinct Observations				34			
336									Number of Missing Observations				0	
337	Minimum				0.15		Mean				1.971			
338	Maximum				11.7		Median				0.66			
339	SD				2.781		Std. Error of Mean				0.47			
340	Coefficient of Variation				1.411		Skewness				2.098			
341														
342	<b>Normal GOF Test</b>													
343	Shapiro Wilk Test Statistic				0.662		<b>Shapiro Wilk GOF Test</b>							
344	5% Shapiro Wilk Critical Value				0.934		Data Not Normal at 5% Significance Level							
345	Lilliefors Test Statistic				0.329		<b>Lilliefors GOF Test</b>							
346	5% Lilliefors Critical Value				0.148		Data Not Normal at 5% Significance Level							
347	<b>Data Not Normal at 5% Significance Level</b>													
348														
349	<b>Assuming Normal Distribution</b>													
350	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>							
351	95% Student's-t UCL				2.766		95% Adjusted-CLT UCL (Chen-1995)				2.922			
352									95% Modified-t UCL (Johnson-1978)				2.793	
353														
354	<b>Gamma GOF Test</b>													
355	A-D Test Statistic				2.201		<b>Anderson-Darling Gamma GOF Test</b>							
356	5% A-D Critical Value				0.785		Data Not Gamma Distributed at 5% Significance Level							
357	K-S Test Statistic				0.232		<b>Kolmogorov-Smirnov Gamma GOF Test</b>							
358	5% K-S Critical Value				0.154		Data Not Gamma Distributed at 5% Significance Level							
359	<b>Data Not Gamma Distributed at 5% Significance Level</b>													
360														
361	<b>Gamma Statistics</b>													
362	k hat (MLE)				0.796		k star (bias corrected MLE)				0.746			
363	Theta hat (MLE)				2.477		Theta star (bias corrected MLE)				2.64			
364	nu hat (MLE)				55.69		nu star (bias corrected)				52.25			
365	MLE Mean (bias corrected)				1.971		MLE Sd (bias corrected)				2.281			
366									Approximate Chi Square Value (0.05)				36.65	
367	Adjusted Level of Significance				0.0425		Adjusted Chi Square Value				36.03			
368														
369	<b>Assuming Gamma Distribution</b>													
370	95% Approximate Gamma UCL (use when n>=50))					2.81		95% Adjusted Gamma UCL (use when n<50)					2.858	
371														

	A	B	C	D	E	F	G	H	I	J	K	L
372	<b>Lognormal GOF Test</b>											
373	Shapiro Wilk Test Statistic					0.922	<b>Shapiro Wilk Lognormal GOF Test</b>					
374	5% Shapiro Wilk Critical Value					0.934	Data Not Lognormal at 5% Significance Level					
375	Lilliefors Test Statistic					0.144	<b>Lilliefors Lognormal GOF Test</b>					
376	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
377	<b>Data appear Approximate Lognormal at 5% Significance Level</b>											
378												
379	<b>Lognormal Statistics</b>											
380	Minimum of Logged Data					-1.897	Mean of logged Data					-0.068
381	Maximum of Logged Data					2.46	SD of logged Data					1.182
382												
383	<b>Assuming Lognormal Distribution</b>											
384	95% H-UCL					3.237	90% Chebyshev (MVUE) UCL					3.131
385	95% Chebyshev (MVUE) UCL					3.726	97.5% Chebyshev (MVUE) UCL					4.551
386	99% Chebyshev (MVUE) UCL					6.173						
387												
388	<b>Nonparametric Distribution Free UCL Statistics</b>											
389	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
390												
391	<b>Nonparametric Distribution Free UCLs</b>											
392	95% CLT UCL					2.744	95% Jackknife UCL					2.766
393	95% Standard Bootstrap UCL					2.723	95% Bootstrap-t UCL					3.123
394	95% Hall's Bootstrap UCL					2.934	95% Percentile Bootstrap UCL					2.789
395	95% BCA Bootstrap UCL					2.965						
396	90% Chebyshev(Mean, Sd) UCL					3.381	95% Chebyshev(Mean, Sd) UCL					4.02
397	97.5% Chebyshev(Mean, Sd) UCL					4.906	99% Chebyshev(Mean, Sd) UCL					6.648
398												
399	<b>Suggested UCL to Use</b>											
400	95% H-UCL					3.237						
401												
402	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
403	Recommendations are based upon data size, data distribution, and skewness.											
404	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
405	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
406												
407	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
408	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
409	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
410	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
411												
412												
413	<b>Chromium</b>											
414												
415	<b>General Statistics</b>											
416	Total Number of Observations					35	Number of Distinct Observations					34
417							Number of Missing Observations					0
418	Minimum					6.5	Mean					29.42
419	Maximum					164	Median					17.2
420	SD					32.76	Std. Error of Mean					5.537
421	Coefficient of Variation					1.113	Skewness					2.595
422												
423	<b>Normal GOF Test</b>											
424	Shapiro Wilk Test Statistic					0.667	<b>Shapiro Wilk GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
425	5% Shapiro Wilk Critical Value					0.934	Data Not Normal at 5% Significance Level					
426	Lilliefors Test Statistic					0.305	Lilliefors GOF Test					
427	5% Lilliefors Critical Value					0.148	Data Not Normal at 5% Significance Level					
428	Data Not Normal at 5% Significance Level											
429												
430	Assuming Normal Distribution											
431	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
432	95% Student's-t UCL					38.79	95% Adjusted-CLT UCL (Chen-1995)					41.13
433							95% Modified-t UCL (Johnson-1978)					39.19
434												
435	Gamma GOF Test											
436	A-D Test Statistic					2.147	Anderson-Darling Gamma GOF Test					
437	5% A-D Critical Value					0.767	Data Not Gamma Distributed at 5% Significance Level					
438	K-S Test Statistic					0.236	Kolmogorov-Smirnov Gamma GOF Test					
439	5% K-S Critical Value					0.152	Data Not Gamma Distributed at 5% Significance Level					
440	Data Not Gamma Distributed at 5% Significance Level											
441												
442	Gamma Statistics											
443	k hat (MLE)					1.456	k star (bias corrected MLE)					1.35
444	Theta hat (MLE)					20.21	Theta star (bias corrected MLE)					21.79
445	nu hat (MLE)					101.9	nu star (bias corrected)					94.51
446	MLE Mean (bias corrected)					29.42	MLE Sd (bias corrected)					25.32
447							Approximate Chi Square Value (0.05)					73.09
448	Adjusted Level of Significance					0.0425	Adjusted Chi Square Value					72.2
449												
450	Assuming Gamma Distribution											
451	95% Approximate Gamma UCL (use when n>=50))					38.05	95% Adjusted Gamma UCL (use when n<50)					38.52
452												
453	Lognormal GOF Test											
454	Shapiro Wilk Test Statistic					0.901	Shapiro Wilk Lognormal GOF Test					
455	5% Shapiro Wilk Critical Value					0.934	Data Not Lognormal at 5% Significance Level					
456	Lilliefors Test Statistic					0.172	Lilliefors Lognormal GOF Test					
457	5% Lilliefors Critical Value					0.148	Data Not Lognormal at 5% Significance Level					
458	Data Not Lognormal at 5% Significance Level											
459												
460	Lognormal Statistics											
461	Minimum of Logged Data					1.872	Mean of logged Data					3.001
462	Maximum of Logged Data					5.1	SD of logged Data					0.81
463												
464	Assuming Lognormal Distribution											
465	95% H-UCL					38.05	90% Chebyshev (MVUE) UCL					40.12
466	95% Chebyshev (MVUE) UCL					45.82	97.5% Chebyshev (MVUE) UCL					53.72
467	99% Chebyshev (MVUE) UCL					69.24						
468												
469	Nonparametric Distribution Free UCL Statistics											
470	Data do not follow a Discernible Distribution (0.05)											
471												
472	Nonparametric Distribution Free UCLs											
473	95% CLT UCL					38.53	95% Jackknife UCL					38.79
474	95% Standard Bootstrap UCL					38.45	95% Bootstrap-t UCL					44.15
475	95% Hall's Bootstrap UCL					45.24	95% Percentile Bootstrap UCL					39.66
476	95% BCA Bootstrap UCL					42.22						
477	90% Chebyshev(Mean, Sd) UCL					46.03	95% Chebyshev(Mean, Sd) UCL					53.56

	A	B	C	D	E	F	G	H	I	J	K	L
478	97.5% Chebyshev(Mean, Sd) UCL					64	99% Chebyshev(Mean, Sd) UCL					84.52
479												
480	<b>Suggested UCL to Use</b>											
481	95% Chebyshev (Mean, Sd) UCL					53.56						
482												
483	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
484	Recommendations are based upon data size, data distribution, and skewness.											
485	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
486	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
487												
488												
489	<b>Cobalt</b>											
490												
491	<b>General Statistics</b>											
492	Total Number of Observations					35	Number of Distinct Observations					29
493							Number of Missing Observations					0
494	Minimum					1.3	Mean					4.134
495	Maximum					8.2	Median					3.8
496	SD					1.523	Std. Error of Mean					0.257
497	Coefficient of Variation					0.368	Skewness					0.311
498												
499	<b>Normal GOF Test</b>											
500	Shapiro Wilk Test Statistic					0.972	<b>Shapiro Wilk GOF Test</b>					
501	5% Shapiro Wilk Critical Value					0.934	Data appear Normal at 5% Significance Level					
502	Lilliefors Test Statistic					0.101	<b>Lilliefors GOF Test</b>					
503	5% Lilliefors Critical Value					0.148	Data appear Normal at 5% Significance Level					
504	<b>Data appear Normal at 5% Significance Level</b>											
505												
506	<b>Assuming Normal Distribution</b>											
507	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
508	95% Student's-t UCL					4.57	95% Adjusted-CLT UCL (Chen-1995)					4.572
509							95% Modified-t UCL (Johnson-1978)					4.572
510												
511	<b>Gamma GOF Test</b>											
512	A-D Test Statistic					0.364	<b>Anderson-Darling Gamma GOF Test</b>					
513	5% A-D Critical Value					0.749	Detected data appear Gamma Distributed at 5% Significance Level					
514	K-S Test Statistic					0.1	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
515	5% K-S Critical Value					0.149	Detected data appear Gamma Distributed at 5% Significance Level					
516	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
517												
518	<b>Gamma Statistics</b>											
519	k hat (MLE)					6.926	k star (bias corrected MLE)					6.352
520	Theta hat (MLE)					0.597	Theta star (bias corrected MLE)					0.651
521	nu hat (MLE)					484.8	nu star (bias corrected)					444.6
522	MLE Mean (bias corrected)					4.134	MLE Sd (bias corrected)					1.64
523							Approximate Chi Square Value (0.05)					396.7
524	Adjusted Level of Significance					0.0425	Adjusted Chi Square Value					394.6
525												
526	<b>Assuming Gamma Distribution</b>											
527	95% Approximate Gamma UCL (use when n>=50))					4.633	95% Adjusted Gamma UCL (use when n<50)					4.658
528												
529	<b>Lognormal GOF Test</b>											
530	Shapiro Wilk Test Statistic					0.957	<b>Shapiro Wilk Lognormal GOF Test</b>					



	A	B	C	D	E	F	G	H	I	J	K	L
531	5% Shapiro Wilk Critical Value					0.934	Data appear Lognormal at 5% Significance Level					
532	Lilliefors Test Statistic					0.0998	Lilliefors Lognormal GOF Test					
533	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
534	Data appear Lognormal at 5% Significance Level											
535												
536	Lognormal Statistics											
537	Minimum of Logged Data					0.262	Mean of logged Data					1.345
538	Maximum of Logged Data					2.104	SD of logged Data					0.408
539												
540	Assuming Lognormal Distribution											
541	95% H-UCL					4.756	90% Chebyshev (MVUE) UCL					5.048
542	95% Chebyshev (MVUE) UCL					5.45	97.5% Chebyshev (MVUE) UCL					6.008
543	99% Chebyshev (MVUE) UCL					7.103						
544												
545	Nonparametric Distribution Free UCL Statistics											
546	Data appear to follow a Discernible Distribution at 5% Significance Level											
547												
548	Nonparametric Distribution Free UCLs											
549	95% CLT UCL					4.558	95% Jackknife UCL					4.57
550	95% Standard Bootstrap UCL					4.541	95% Bootstrap-t UCL					4.574
551	95% Hall's Bootstrap UCL					4.574	95% Percentile Bootstrap UCL					4.554
552	95% BCA Bootstrap UCL					4.563						
553	90% Chebyshev(Mean, Sd) UCL					4.907	95% Chebyshev(Mean, Sd) UCL					5.256
554	97.5% Chebyshev(Mean, Sd) UCL					5.742	99% Chebyshev(Mean, Sd) UCL					6.696
555												
556	Suggested UCL to Use											
557	95% Student's-t UCL					4.57						
558												
559	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
560	Recommendations are based upon data size, data distribution, and skewness.											
561	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
562	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
563												
564												
565	Copper											
566												
567	General Statistics											
568	Total Number of Observations					35	Number of Distinct Observations					35
569							Number of Missing Observations					0
570	Minimum					8.7	Mean					102.4
571	Maximum					1420	Median					36
572	SD					243.5	Std. Error of Mean					41.15
573	Coefficient of Variation					2.379	Skewness					4.999
574												
575	Normal GOF Test											
576	Shapiro Wilk Test Statistic					0.373	Shapiro Wilk GOF Test					
577	5% Shapiro Wilk Critical Value					0.934	Data Not Normal at 5% Significance Level					
578	Lilliefors Test Statistic					0.38	Lilliefors GOF Test					
579	5% Lilliefors Critical Value					0.148	Data Not Normal at 5% Significance Level					
580	Data Not Normal at 5% Significance Level											
581												
582	Assuming Normal Distribution											
583	95% Normal UCL						95% UCLs (Adjusted for Skewness)					

	A	B	C	D	E	F	G	H	I	J	K	L
584	95% Student's-t UCL					171.9	95% Adjusted-CLT UCL (Chen-1995)					207.2
585							95% Modified-t UCL (Johnson-1978)					177.7
586												
587	<b>Gamma GOF Test</b>											
588	A-D Test Statistic					2.999	<b>Anderson-Darling Gamma GOF Test</b>					
589	5% A-D Critical Value					0.792	Data Not Gamma Distributed at 5% Significance Level					
590	K-S Test Statistic					0.22	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
591	5% K-S Critical Value					0.155	Data Not Gamma Distributed at 5% Significance Level					
592	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
593												
594	<b>Gamma Statistics</b>											
595	k hat (MLE)					0.711	k star (bias corrected MLE)					0.669
596	Theta hat (MLE)					144	Theta star (bias corrected MLE)					153.1
597	nu hat (MLE)					49.74	nu star (bias corrected)					46.81
598	MLE Mean (bias corrected)					102.4	MLE Sd (bias corrected)					125.2
599							Approximate Chi Square Value (0.05)					32.11
600	Adjusted Level of Significance					0.0425	Adjusted Chi Square Value					31.53
601												
602	<b>Assuming Gamma Distribution</b>											
603	95% Approximate Gamma UCL (use when n>=50))					149.2	95% Adjusted Gamma UCL (use when n<50)					151.9
604												
605	<b>Lognormal GOF Test</b>											
606	Shapiro Wilk Test Statistic					0.92	<b>Shapiro Wilk Lognormal GOF Test</b>					
607	5% Shapiro Wilk Critical Value					0.934	Data Not Lognormal at 5% Significance Level					
608	Lilliefors Test Statistic					0.119	<b>Lilliefors Lognormal GOF Test</b>					
609	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
610	<b>Data appear Approximate Lognormal at 5% Significance Level</b>											
611												
612	<b>Lognormal Statistics</b>											
613	Minimum of Logged Data					2.163	Mean of logged Data					3.78
614	Maximum of Logged Data					7.258	SD of logged Data					1.084
615												
616	<b>Assuming Lognormal Distribution</b>											
617	95% H-UCL					126.9	90% Chebyshev (MVUE) UCL					126.7
618	95% Chebyshev (MVUE) UCL					149.3	97.5% Chebyshev (MVUE) UCL					180.6
619	99% Chebyshev (MVUE) UCL					242.2						
620												
621	<b>Nonparametric Distribution Free UCL Statistics</b>											
622	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
623												
624	<b>Nonparametric Distribution Free UCLs</b>											
625	95% CLT UCL					170	95% Jackknife UCL					171.9
626	95% Standard Bootstrap UCL					167.9	95% Bootstrap-t UCL					331
627	95% Hall's Bootstrap UCL					381	95% Percentile Bootstrap UCL					180.6
628	95% BCA Bootstrap UCL					232.7						
629	90% Chebyshev(Mean, Sd) UCL					225.8	95% Chebyshev(Mean, Sd) UCL					281.7
630	97.5% Chebyshev(Mean, Sd) UCL					359.3	99% Chebyshev(Mean, Sd) UCL					511.8
631												
632	<b>Suggested UCL to Use</b>											
633	95% H-UCL					126.9						
634												
635	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
636	Recommendations are based upon data size, data distribution, and skewness.											

	A	B	C	D	E	F	G	H	I	J	K	L
637	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
638	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
639												
640	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
641	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
642	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
643	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
644												
645												
646	<b>Lead</b>											
647												
648	<b>General Statistics</b>											
649	Total Number of Observations				35		Number of Distinct Observations				34	
650							Number of Missing Observations				0	
651	Minimum				9.7		Mean				228.3	
652	Maximum				760		Median				151	
653	SD				206.4		Std. Error of Mean				34.89	
654	Coefficient of Variation				0.904		Skewness				1.139	
655												
656	<b>Normal GOF Test</b>											
657	Shapiro Wilk Test Statistic				0.854		<b>Shapiro Wilk GOF Test</b>					
658	5% Shapiro Wilk Critical Value				0.934		Data Not Normal at 5% Significance Level					
659	Lilliefors Test Statistic				0.199		<b>Lilliefors GOF Test</b>					
660	5% Lilliefors Critical Value				0.148		Data Not Normal at 5% Significance Level					
661	<b>Data Not Normal at 5% Significance Level</b>											
662												
663	<b>Assuming Normal Distribution</b>											
664	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
665	95% Student's-t UCL				287.3		95% Adjusted-CLT UCL (Chen-1995)				292.8	
666							95% Modified-t UCL (Johnson-1978)				288.4	
667												
668	<b>Gamma GOF Test</b>											
669	A-D Test Statistic				0.287		<b>Anderson-Darling Gamma GOF Test</b>					
670	5% A-D Critical Value				0.772		Detected data appear Gamma Distributed at 5% Significance Level					
671	K-S Test Statistic				0.0916		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
672	5% K-S Critical Value				0.152		Detected data appear Gamma Distributed at 5% Significance Level					
673	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
674												
675	<b>Gamma Statistics</b>											
676	k hat (MLE)				1.207		k star (bias corrected MLE)				1.122	
677	Theta hat (MLE)				189.2		Theta star (bias corrected MLE)				203.4	
678	nu hat (MLE)				84.47		nu star (bias corrected)				78.57	
679	MLE Mean (bias corrected)				228.3		MLE Sd (bias corrected)				215.5	
680							Approximate Chi Square Value (0.05)				59.15	
681	Adjusted Level of Significance				0.0425		Adjusted Chi Square Value				58.35	
682												
683	<b>Assuming Gamma Distribution</b>											
684	95% Approximate Gamma UCL (use when n>=50)				303.2		95% Adjusted Gamma UCL (use when n<50)				307.4	
685												
686	<b>Lognormal GOF Test</b>											
687	Shapiro Wilk Test Statistic				0.961		<b>Shapiro Wilk Lognormal GOF Test</b>					
688	5% Shapiro Wilk Critical Value				0.934		Data appear Lognormal at 5% Significance Level					
689	Lilliefors Test Statistic				0.089		<b>Lilliefors Lognormal GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
690	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
691	Data appear Lognormal at 5% Significance Level											
692												
693	Lognormal Statistics											
694	Minimum of Logged Data					2.272	Mean of logged Data					4.962
695	Maximum of Logged Data					6.633	SD of logged Data					1.086
696												
697	Assuming Lognormal Distribution											
698	95% H-UCL					415.2	90% Chebyshev (MVUE) UCL					414.4
699	95% Chebyshev (MVUE) UCL					488.4	97.5% Chebyshev (MVUE) UCL					591
700	99% Chebyshev (MVUE) UCL					792.7						
701												
702	Nonparametric Distribution Free UCL Statistics											
703	Data appear to follow a Discernible Distribution at 5% Significance Level											
704												
705	Nonparametric Distribution Free UCLs											
706	95% CLT UCL					285.7	95% Jackknife UCL					287.3
707	95% Standard Bootstrap UCL					285.9	95% Bootstrap-t UCL					298.4
708	95% Hall's Bootstrap UCL					294	95% Percentile Bootstrap UCL					285.5
709	95% BCA Bootstrap UCL					294						
710	90% Chebyshev(Mean, Sd) UCL					332.9	95% Chebyshev(Mean, Sd) UCL					380.4
711	97.5% Chebyshev(Mean, Sd) UCL					446.2	99% Chebyshev(Mean, Sd) UCL					575.4
712												
713	Suggested UCL to Use											
714	95% Adjusted Gamma UCL					307.4						
715												
716	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
717	Recommendations are based upon data size, data distribution, and skewness.											
718	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
719	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
720												
721												
722	Manganese											
723												
724	General Statistics											
725	Total Number of Observations					35	Number of Distinct Observations					35
726							Number of Missing Observations					0
727	Minimum					141	Mean					884.4
728	Maximum					3070	Median					660
729	SD					630.8	Std. Error of Mean					106.6
730	Coefficient of Variation					0.713	Skewness					1.579
731												
732	Normal GOF Test											
733	Shapiro Wilk Test Statistic					0.841	Shapiro Wilk GOF Test					
734	5% Shapiro Wilk Critical Value					0.934	Data Not Normal at 5% Significance Level					
735	Lilliefors Test Statistic					0.208	Lilliefors GOF Test					
736	5% Lilliefors Critical Value					0.148	Data Not Normal at 5% Significance Level					
737	Data Not Normal at 5% Significance Level											
738												
739	Assuming Normal Distribution											
740	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
741	95% Student's-t UCL					1065	95% Adjusted-CLT UCL (Chen-1995)					1090
742							95% Modified-t UCL (Johnson-1978)					1069

	A	B	C	D	E	F	G	H	I	J	K	L
743												
744	<b>Gamma GOF Test</b>											
745	A-D Test Statistic					0.714	<b>Anderson-Darling Gamma GOF Test</b>					
746	5% A-D Critical Value					0.757	Detected data appear Gamma Distributed at 5% Significance Level					
747	K-S Test Statistic					0.143	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
748	5% K-S Critical Value					0.15	Detected data appear Gamma Distributed at 5% Significance Level					
749	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
750												
751	<b>Gamma Statistics</b>											
752	k hat (MLE)					2.44	k star (bias corrected MLE)					2.25
753	Theta hat (MLE)					362.4	Theta star (bias corrected MLE)					393.1
754	nu hat (MLE)					170.8	nu star (bias corrected)					157.5
755	MLE Mean (bias corrected)					884.4	MLE Sd (bias corrected)					589.6
756							Approximate Chi Square Value (0.05)					129.5
757	Adjusted Level of Significance					0.0425	Adjusted Chi Square Value					128.3
758												
759	<b>Assuming Gamma Distribution</b>											
760	95% Approximate Gamma UCL (use when n>=50)					1076	95% Adjusted Gamma UCL (use when n<50)					1086
761												
762	<b>Lognormal GOF Test</b>											
763	Shapiro Wilk Test Statistic					0.977	<b>Shapiro Wilk Lognormal GOF Test</b>					
764	5% Shapiro Wilk Critical Value					0.934	Data appear Lognormal at 5% Significance Level					
765	Lilliefors Test Statistic					0.0995	<b>Lilliefors Lognormal GOF Test</b>					
766	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
767	<b>Data appear Lognormal at 5% Significance Level</b>											
768												
769	<b>Lognormal Statistics</b>											
770	Minimum of Logged Data					4.949	Mean of logged Data					6.566
771	Maximum of Logged Data					8.029	SD of logged Data					0.672
772												
773	<b>Assuming Lognormal Distribution</b>											
774	95% H-UCL					1134	90% Chebyshev (MVUE) UCL					1210
775	95% Chebyshev (MVUE) UCL					1357	97.5% Chebyshev (MVUE) UCL					1562
776	99% Chebyshev (MVUE) UCL					1964						
777												
778	<b>Nonparametric Distribution Free UCL Statistics</b>											
779	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
780												
781	<b>Nonparametric Distribution Free UCLs</b>											
782	95% CLT UCL					1060	95% Jackknife UCL					1065
783	95% Standard Bootstrap UCL					1057	95% Bootstrap-t UCL					1089
784	95% Hall's Bootstrap UCL					1118	95% Percentile Bootstrap UCL					1067
785	95% BCA Bootstrap UCL					1088						
786	90% Chebyshev(Mean, Sd) UCL					1204	95% Chebyshev(Mean, Sd) UCL					1349
787	97.5% Chebyshev(Mean, Sd) UCL					1550	99% Chebyshev(Mean, Sd) UCL					1945
788												
789	<b>Suggested UCL to Use</b>											
790	95% Adjusted Gamma UCL					1086						
791												
792	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
793	Recommendations are based upon data size, data distribution, and skewness.											
794	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
795	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											



	A	B	C	D	E	F	G	H	I	J	K	L
849	<b>Assuming Lognormal Distribution</b>											
850	95% H-UCL				0.463	90% Chebyshev (MVUE) UCL					0.475	
851	95% Chebyshev (MVUE) UCL				0.554	97.5% Chebyshev (MVUE) UCL					0.665	
852	99% Chebyshev (MVUE) UCL				0.883							
853												
854	<b>Nonparametric Distribution Free UCL Statistics</b>											
855	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
856												
857	<b>Nonparametric Distribution Free UCLs</b>											
858	95% CLT UCL				0.353	95% Jackknife UCL					0.355	
859	95% Standard Bootstrap UCL				0.351	95% Bootstrap-t UCL					0.378	
860	95% Hall's Bootstrap UCL				0.37	95% Percentile Bootstrap UCL					0.355	
861	95% BCA Bootstrap UCL				0.368							
862	90% Chebyshev(Mean, Sd) UCL				0.413	95% Chebyshev(Mean, Sd) UCL					0.473	
863	97.5% Chebyshev(Mean, Sd) UCL				0.556	99% Chebyshev(Mean, Sd) UCL					0.719	
864												
865	<b>Suggested UCL to Use</b>											
866	95% Adjusted Gamma UCL				0.375							
867												
868	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
869	Recommendations are based upon data size, data distribution, and skewness.											
870	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
871	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
872												
873												
874	<b>Silver</b>											
875												
876	<b>General Statistics</b>											
877	Total Number of Observations				21	Number of Distinct Observations				14		
878						Number of Missing Observations				0		
879	Minimum				0.09	Mean				1.27		
880	Maximum				10.7	Median				0.3		
881	SD				2.32	Std. Error of Mean				0.506		
882	Coefficient of Variation				1.826	Skewness				3.667		
883												
884	<b>Normal GOF Test</b>											
885	Shapiro Wilk Test Statistic				0.519	<b>Shapiro Wilk GOF Test</b>						
886	5% Shapiro Wilk Critical Value				0.908	Data Not Normal at 5% Significance Level						
887	Lilliefors Test Statistic				0.305	<b>Lilliefors GOF Test</b>						
888	5% Lilliefors Critical Value				0.188	Data Not Normal at 5% Significance Level						
889	<b>Data Not Normal at 5% Significance Level</b>											
890												
891	<b>Assuming Normal Distribution</b>											
892	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>						
893	95% Student's-t UCL				2.144	95% Adjusted-CLT UCL (Chen-1995)				2.536		
894						95% Modified-t UCL (Johnson-1978)				2.211		
895												
896	<b>Gamma GOF Test</b>											
897	A-D Test Statistic				1.043	<b>Anderson-Darling Gamma GOF Test</b>						
898	5% A-D Critical Value				0.793	Data Not Gamma Distributed at 5% Significance Level						
899	K-S Test Statistic				0.208	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
900	5% K-S Critical Value				0.199	Data Not Gamma Distributed at 5% Significance Level						
901	<b>Data Not Gamma Distributed at 5% Significance Level</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
902												
903	<b>Gamma Statistics</b>											
904	k hat (MLE)				0.632		k star (bias corrected MLE)				0.574	
905	Theta hat (MLE)				2.009		Theta star (bias corrected MLE)				2.214	
906	nu hat (MLE)				26.56		nu star (bias corrected)				24.1	
907	MLE Mean (bias corrected)				1.27		MLE Sd (bias corrected)				1.677	
908							Approximate Chi Square Value (0.05)				13.93	
909	Adjusted Level of Significance				0.0383		Adjusted Chi Square Value				13.33	
910												
911	<b>Assuming Gamma Distribution</b>											
912	95% Approximate Gamma UCL (use when n>=50))				2.199		95% Adjusted Gamma UCL (use when n<50)				2.297	
913												
914	<b>Lognormal GOF Test</b>											
915	Shapiro Wilk Test Statistic				0.917		<b>Shapiro Wilk Lognormal GOF Test</b>					
916	5% Shapiro Wilk Critical Value				0.908		Data appear Lognormal at 5% Significance Level					
917	Lilliefors Test Statistic				0.164		<b>Lilliefors Lognormal GOF Test</b>					
918	5% Lilliefors Critical Value				0.188		Data appear Lognormal at 5% Significance Level					
919	<b>Data appear Lognormal at 5% Significance Level</b>											
920												
921	<b>Lognormal Statistics</b>											
922	Minimum of Logged Data				-2.408		Mean of logged Data				-0.73	
923	Maximum of Logged Data				2.37		SD of logged Data				1.394	
924												
925	<b>Assuming Lognormal Distribution</b>											
926	95% H-UCL				3.392		90% Chebyshev (MVUE) UCL				2.447	
927	95% Chebyshev (MVUE) UCL				3.024		97.5% Chebyshev (MVUE) UCL				3.825	
928	99% Chebyshev (MVUE) UCL				5.398							
929												
930	<b>Nonparametric Distribution Free UCL Statistics</b>											
931	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
932												
933	<b>Nonparametric Distribution Free UCLs</b>											
934	95% CLT UCL				2.103		95% Jackknife UCL				2.144	
935	95% Standard Bootstrap UCL				2.066		95% Bootstrap-t UCL				3.411	
936	95% Hall's Bootstrap UCL				5.193		95% Percentile Bootstrap UCL				2.171	
937	95% BCA Bootstrap UCL				2.766							
938	90% Chebyshev(Mean, Sd) UCL				2.789		95% Chebyshev(Mean, Sd) UCL				3.477	
939	97.5% Chebyshev(Mean, Sd) UCL				4.432		99% Chebyshev(Mean, Sd) UCL				6.308	
940												
941	<b>Suggested UCL to Use</b>											
942	95% Chebyshev (Mean, Sd) UCL				3.477							
943												
944	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
945	Recommendations are based upon data size, data distribution, and skewness.											
946	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
947	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
948												
949												
950	<b>Thallium</b>											
951												
952	<b>General Statistics</b>											
953	Total Number of Observations				12		Number of Distinct Observations				11	
954							Number of Missing Observations				0	



	A	B	C	D	E	F	G	H	I	J	K	L	
955					Minimum	0.8					Mean	2.18	
956					Maximum	4					Median	1.95	
957					SD	0.954					Std. Error of Mean	0.275	
958					Coefficient of Variation	0.438					Skewness	0.728	
959													
960	<b>Normal GOF Test</b>												
961					Shapiro Wilk Test Statistic	0.929					<b>Shapiro Wilk GOF Test</b>		
962					5% Shapiro Wilk Critical Value	0.859					Data appear Normal at 5% Significance Level		
963					Lilliefors Test Statistic	0.2					<b>Lilliefors GOF Test</b>		
964					5% Lilliefors Critical Value	0.243					Data appear Normal at 5% Significance Level		
965	<b>Data appear Normal at 5% Significance Level</b>												
966													
967	<b>Assuming Normal Distribution</b>												
968					<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>		
969					95% Student's-t UCL	2.675				95% Adjusted-CLT UCL (Chen-1995)	2.695		
970										95% Modified-t UCL (Johnson-1978)	2.684		
971													
972	<b>Gamma GOF Test</b>												
973					A-D Test Statistic	0.269					<b>Anderson-Darling Gamma GOF Test</b>		
974					5% A-D Critical Value	0.732					Detected data appear Gamma Distributed at 5% Significance Level		
975					K-S Test Statistic	0.146					<b>Kolmogorov-Smirnov Gamma GOF Test</b>		
976					5% K-S Critical Value	0.246					Detected data appear Gamma Distributed at 5% Significance Level		
977	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
978													
979	<b>Gamma Statistics</b>												
980					k hat (MLE)	5.731					k star (bias corrected MLE)	4.354	
981					Theta hat (MLE)	0.38					Theta star (bias corrected MLE)	0.501	
982					nu hat (MLE)	137.5					nu star (bias corrected)	104.5	
983					MLE Mean (bias corrected)	2.18					MLE Sd (bias corrected)	1.045	
984											Approximate Chi Square Value (0.05)	81.9	
985					Adjusted Level of Significance	0.029					Adjusted Chi Square Value	78.85	
986													
987	<b>Assuming Gamma Distribution</b>												
988					95% Approximate Gamma UCL (use when n>=50))	2.781					95% Adjusted Gamma UCL (use when n<50)	2.889	
989													
990	<b>Lognormal GOF Test</b>												
991					Shapiro Wilk Test Statistic	0.965					<b>Shapiro Wilk Lognormal GOF Test</b>		
992					5% Shapiro Wilk Critical Value	0.859					Data appear Lognormal at 5% Significance Level		
993					Lilliefors Test Statistic	0.147					<b>Lilliefors Lognormal GOF Test</b>		
994					5% Lilliefors Critical Value	0.243					Data appear Lognormal at 5% Significance Level		
995	<b>Data appear Lognormal at 5% Significance Level</b>												
996													
997	<b>Lognormal Statistics</b>												
998					Minimum of Logged Data	-0.223					Mean of logged Data	0.69	
999					Maximum of Logged Data	1.386					SD of logged Data	0.452	
1000													
1001	<b>Assuming Lognormal Distribution</b>												
1002					95% H-UCL	2.931					90% Chebyshev (MVUE) UCL	3.059	
1003					95% Chebyshev (MVUE) UCL	3.454					97.5% Chebyshev (MVUE) UCL	4.003	
1004					99% Chebyshev (MVUE) UCL	5.08							
1005													
1006	<b>Nonparametric Distribution Free UCL Statistics</b>												
1007	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												

	A	B	C	D	E	F	G	H	I	J	K	L
1008												
1009	<b>Nonparametric Distribution Free UCLs</b>											
1010	95% CLT UCL				2.633		95% Jackknife UCL				2.675	
1011	95% Standard Bootstrap UCL				2.62		95% Bootstrap-t UCL				2.805	
1012	95% Hall's Bootstrap UCL				2.801		95% Percentile Bootstrap UCL				2.618	
1013	95% BCA Bootstrap UCL				2.652							
1014	90% Chebyshev(Mean, Sd) UCL				3.006		95% Chebyshev(Mean, Sd) UCL				3.38	
1015	97.5% Chebyshev(Mean, Sd) UCL				3.9		99% Chebyshev(Mean, Sd) UCL				4.92	
1016												
1017	<b>Suggested UCL to Use</b>											
1018	95% Student's-t UCL				2.675							
1019												
1020	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1021	Recommendations are based upon data size, data distribution, and skewness.											
1022	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1023	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1024												
1025												
1026	<b>Vanadium</b>											
1027												
1028	<b>General Statistics</b>											
1029	Total Number of Observations				35		Number of Distinct Observations				33	
1030							Number of Missing Observations				0	
1031	Minimum				8.5		Mean				18.37	
1032	Maximum				69.7		Median				16.7	
1033	SD				10.06		Std. Error of Mean				1.7	
1034	Coefficient of Variation				0.547		Skewness				4.07	
1035												
1036	<b>Normal GOF Test</b>											
1037	Shapiro Wilk Test Statistic				0.602		<b>Shapiro Wilk GOF Test</b>					
1038	5% Shapiro Wilk Critical Value				0.934		Data Not Normal at 5% Significance Level					
1039	Lilliefors Test Statistic				0.266		<b>Lilliefors GOF Test</b>					
1040	5% Lilliefors Critical Value				0.148		Data Not Normal at 5% Significance Level					
1041	<b>Data Not Normal at 5% Significance Level</b>											
1042												
1043	<b>Assuming Normal Distribution</b>											
1044	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
1045	95% Student's-t UCL				21.25		95% Adjusted-CLT UCL (Chen-1995)				22.42	
1046							95% Modified-t UCL (Johnson-1978)				21.44	
1047												
1048	<b>Gamma GOF Test</b>											
1049	A-D Test Statistic				1.255		<b>Anderson-Darling Gamma GOF Test</b>					
1050	5% A-D Critical Value				0.749		Data Not Gamma Distributed at 5% Significance Level					
1051	K-S Test Statistic				0.181		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
1052	5% K-S Critical Value				0.149		Data Not Gamma Distributed at 5% Significance Level					
1053	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
1054												
1055	<b>Gamma Statistics</b>											
1056	k hat (MLE)				6.163		k star (bias corrected MLE)				5.654	
1057	Theta hat (MLE)				2.981		Theta star (bias corrected MLE)				3.25	
1058	nu hat (MLE)				431.4		nu star (bias corrected)				395.8	
1059	MLE Mean (bias corrected)				18.37		MLE Sd (bias corrected)				7.727	
1060							Approximate Chi Square Value (0.05)				350.7	

	A	B	C	D	E	F	G	H	I	J	K	L
1061	Adjusted Level of Significance					0.0425	Adjusted Chi Square Value					348.7
1062												
1063	<b>Assuming Gamma Distribution</b>											
1064	95% Approximate Gamma UCL (use when n>=50))					20.74	95% Adjusted Gamma UCL (use when n<50)					20.86
1065												
1066	<b>Lognormal GOF Test</b>											
1067	Shapiro Wilk Test Statistic					0.903	<b>Shapiro Wilk Lognormal GOF Test</b>					
1068	5% Shapiro Wilk Critical Value					0.934	Data Not Lognormal at 5% Significance Level					
1069	Lilliefors Test Statistic					0.15	<b>Lilliefors Lognormal GOF Test</b>					
1070	5% Lilliefors Critical Value					0.148	Data Not Lognormal at 5% Significance Level					
1071	<b>Data Not Lognormal at 5% Significance Level</b>											
1072												
1073	<b>Lognormal Statistics</b>											
1074	Minimum of Logged Data					2.14	Mean of logged Data					2.828
1075	Maximum of Logged Data					4.244	SD of logged Data					0.377
1076												
1077	<b>Assuming Lognormal Distribution</b>											
1078	95% H-UCL					20.46	90% Chebyshev (MVUE) UCL					21.66
1079	95% Chebyshev (MVUE) UCL					23.27	97.5% Chebyshev (MVUE) UCL					25.51
1080	99% Chebyshev (MVUE) UCL					29.89						
1081												
1082	<b>Nonparametric Distribution Free UCL Statistics</b>											
1083	<b>Data do not follow a Discernible Distribution (0.05)</b>											
1084												
1085	<b>Nonparametric Distribution Free UCLs</b>											
1086	95% CLT UCL					21.17	95% Jackknife UCL					21.25
1087	95% Standard Bootstrap UCL					21.15	95% Bootstrap-t UCL					23.66
1088	95% Hall's Bootstrap UCL					33.53	95% Percentile Bootstrap UCL					21.36
1089	95% BCA Bootstrap UCL					22.72						
1090	90% Chebyshev(Mean, Sd) UCL					23.47	95% Chebyshev(Mean, Sd) UCL					25.78
1091	97.5% Chebyshev(Mean, Sd) UCL					28.99	99% Chebyshev(Mean, Sd) UCL					35.29
1092												
1093	<b>Suggested UCL to Use</b>											
1094	95% Student's-t UCL					21.25	or 95% Modified-t UCL					21.44
1095												
1096	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1097	Recommendations are based upon data size, data distribution, and skewness.											
1098	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1099	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1100												
1101												
1102	<b>Zinc</b>											
1103												
1104	<b>General Statistics</b>											
1105	Total Number of Observations					35	Number of Distinct Observations					34
1106							Number of Missing Observations					0
1107	Minimum					41.2	Mean					390.1
1108	Maximum					1890	Median					172
1109	SD					459.3	Std. Error of Mean					77.64
1110	Coefficient of Variation					1.178	Skewness					1.743
1111												
1112	<b>Normal GOF Test</b>											
1113	Shapiro Wilk Test Statistic					0.734	<b>Shapiro Wilk GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
1114	5% Shapiro Wilk Critical Value					0.934	Data Not Normal at 5% Significance Level					
1115	Lilliefors Test Statistic					0.268	Lilliefors GOF Test					
1116	5% Lilliefors Critical Value					0.148	Data Not Normal at 5% Significance Level					
1117	Data Not Normal at 5% Significance Level											
1118												
1119	Assuming Normal Distribution											
1120	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
1121	95% Student's-t UCL					521.4	95% Adjusted-CLT UCL (Chen-1995)					542.2
1122							95% Modified-t UCL (Johnson-1978)					525.2
1123												
1124	Gamma GOF Test											
1125	A-D Test Statistic					1.556	Anderson-Darling Gamma GOF Test					
1126	5% A-D Critical Value					0.776	Data Not Gamma Distributed at 5% Significance Level					
1127	K-S Test Statistic					0.185	Kolmogorov-Smirnov Gamma GOF Test					
1128	5% K-S Critical Value					0.153	Data Not Gamma Distributed at 5% Significance Level					
1129	Data Not Gamma Distributed at 5% Significance Level											
1130												
1131	Gamma Statistics											
1132	k hat (MLE)					0.998	k star (bias corrected MLE)					0.931
1133	Theta hat (MLE)					390.9	Theta star (bias corrected MLE)					418.8
1134	nu hat (MLE)					69.85	nu star (bias corrected)					65.19
1135	MLE Mean (bias corrected)					390.1	MLE Sd (bias corrected)					404.2
1136							Approximate Chi Square Value (0.05)					47.62
1137	Adjusted Level of Significance					0.0425	Adjusted Chi Square Value					46.9
1138												
1139	Assuming Gamma Distribution											
1140	95% Approximate Gamma UCL (use when n>=50))					534.1	95% Adjusted Gamma UCL (use when n<50)					542.2
1141												
1142	Lognormal GOF Test											
1143	Shapiro Wilk Test Statistic					0.933	Shapiro Wilk Lognormal GOF Test					
1144	5% Shapiro Wilk Critical Value					0.934	Data Not Lognormal at 5% Significance Level					
1145	Lilliefors Test Statistic					0.13	Lilliefors Lognormal GOF Test					
1146	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
1147	Data appear Approximate Lognormal at 5% Significance Level											
1148												
1149	Lognormal Statistics											
1150	Minimum of Logged Data					3.718	Mean of logged Data					5.388
1151	Maximum of Logged Data					7.544	SD of logged Data					1.068
1152												
1153	Assuming Lognormal Distribution											
1154	95% H-UCL					615.3	90% Chebyshev (MVUE) UCL					617.4
1155	95% Chebyshev (MVUE) UCL					726.2	97.5% Chebyshev (MVUE) UCL					877.1
1156	99% Chebyshev (MVUE) UCL					1174						
1157												
1158	Nonparametric Distribution Free UCL Statistics											
1159	Data appear to follow a Discernible Distribution at 5% Significance Level											
1160												
1161	Nonparametric Distribution Free UCLs											
1162	95% CLT UCL					517.8	95% Jackknife UCL					521.4
1163	95% Standard Bootstrap UCL					519.7	95% Bootstrap-t UCL					572.1
1164	95% Hall's Bootstrap UCL					545.8	95% Percentile Bootstrap UCL					520.1
1165	95% BCA Bootstrap UCL					528.2						
1166	90% Chebyshev(Mean, Sd) UCL					623	95% Chebyshev(Mean, Sd) UCL					728.5

	A	B	C	D	E	F	G	H	I	J	K	L
1167	97.5% Chebyshev(Mean, Sd) UCL					875	99% Chebyshev(Mean, Sd) UCL					1163
1168												
1169	<b>Suggested UCL to Use</b>											
1170	95% H-UCL				615.3							
1171												
1172	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1173	Recommendations are based upon data size, data distribution, and skewness.											
1174	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1175	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1176												
1177	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
1178	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
1179	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
1180	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
1181												
1182												
1183	<b>Aroclor 1248</b>											
1184												
1185	<b>General Statistics</b>											
1186	Total Number of Observations				7	Number of Distinct Observations				7		
1187						Number of Missing Observations				0		
1188	Minimum				4.6000E-5	Mean				0.164		
1189	Maximum				0.29	Median				0.14		
1190	SD				0.114	Std. Error of Mean				0.043		
1191	Coefficient of Variation				0.694	Skewness				-0.137		
1192												
1193	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1194	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1195	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1196	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1197												
1198	<b>Normal GOF Test</b>											
1199	Shapiro Wilk Test Statistic				0.902	<b>Shapiro Wilk GOF Test</b>						
1200	5% Shapiro Wilk Critical Value				0.803	Data appear Normal at 5% Significance Level						
1201	Lilliefors Test Statistic				0.23	<b>Lilliefors GOF Test</b>						
1202	5% Lilliefors Critical Value				0.304	Data appear Normal at 5% Significance Level						
1203	<b>Data appear Normal at 5% Significance Level</b>											
1204												
1205	<b>Assuming Normal Distribution</b>											
1206	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>						
1207	95% Student's-t UCL				0.247	95% Adjusted-CLT UCL (Chen-1995)				0.232		
1208						95% Modified-t UCL (Johnson-1978)				0.247		
1209												
1210	<b>Gamma GOF Test</b>											
1211	A-D Test Statistic				1.05	<b>Anderson-Darling Gamma GOF Test</b>						
1212	5% A-D Critical Value				0.749	Data Not Gamma Distributed at 5% Significance Level						
1213	K-S Test Statistic				0.347	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
1214	5% K-S Critical Value				0.326	Data Not Gamma Distributed at 5% Significance Level						
1215	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
1216												
1217	<b>Gamma Statistics</b>											
1218	k hat (MLE)				0.547	k star (bias corrected MLE)				0.408		
1219	Theta hat (MLE)				0.3	Theta star (bias corrected MLE)				0.402		

	A	B	C	D	E	F	G	H	I	J	K	L	
1220					nu hat (MLE)	7.659				nu star (bias corrected)		5.71	
1221					MLE Mean (bias corrected)	0.164				MLE Sd (bias corrected)		0.257	
1222										Approximate Chi Square Value (0.05)		1.493	
1223					Adjusted Level of Significance	0.0158				Adjusted Chi Square Value		0.938	
1224													
1225					<b>Assuming Gamma Distribution</b>								
1226					95% Approximate Gamma UCL (use when n>=50))	0.627				95% Adjusted Gamma UCL (use when n<50)		0.998	
1227													
1228					<b>Lognormal GOF Test</b>								
1229					Shapiro Wilk Test Statistic	0.602				<b>Shapiro Wilk Lognormal GOF Test</b>			
1230					5% Shapiro Wilk Critical Value	0.803				Data Not Lognormal at 5% Significance Level			
1231					Lilliefors Test Statistic	0.406				<b>Lilliefors Lognormal GOF Test</b>			
1232					5% Lilliefors Critical Value	0.304				Data Not Lognormal at 5% Significance Level			
1233					<b>Data Not Lognormal at 5% Significance Level</b>								
1234													
1235					<b>Lognormal Statistics</b>								
1236					Minimum of Logged Data	-9.987				Mean of logged Data		-2.954	
1237					Maximum of Logged Data	-1.238				SD of logged Data		3.146	
1238													
1239					<b>Assuming Lognormal Distribution</b>								
1240					95% H-UCL	4717790				90% Chebyshev (MVUE) UCL		4.257	
1241					95% Chebyshev (MVUE) UCL	5.661				97.5% Chebyshev (MVUE) UCL		7.61	
1242					99% Chebyshev (MVUE) UCL	11.44							
1243													
1244					<b>Nonparametric Distribution Free UCL Statistics</b>								
1245					<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>								
1246													
1247					<b>Nonparametric Distribution Free UCLs</b>								
1248					95% CLT UCL	0.235				95% Jackknife UCL		0.247	
1249					95% Standard Bootstrap UCL	0.228				95% Bootstrap-t UCL		0.248	
1250					95% Hall's Bootstrap UCL	0.22				95% Percentile Bootstrap UCL		0.23	
1251					95% BCA Bootstrap UCL	0.23							
1252					90% Chebyshev(Mean, Sd) UCL	0.293				95% Chebyshev(Mean, Sd) UCL		0.351	
1253					97.5% Chebyshev(Mean, Sd) UCL	0.432				99% Chebyshev(Mean, Sd) UCL		0.592	
1254													
1255					<b>Suggested UCL to Use</b>								
1256					95% Student's-t UCL	0.247							
1257													
1258					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1259					Recommendations are based upon data size, data distribution, and skewness.								
1260					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
1261					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
1262													
1263					<b>Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be</b>								
1264					<b>reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.</b>								
1265													
1266													
1267					<b>Aroclor 1254</b>								
1268													
1269					<b>General Statistics</b>								
1270					Total Number of Observations	9				Number of Distinct Observations		8	
1271										Number of Missing Observations		0	
1272					Minimum	0.05				Mean		0.494	

	A	B	C	D	E	F	G	H	I	J	K	L
1273					Maximum	0.93					Median	0.47
1274					SD	0.33					Std. Error of Mean	0.11
1275					Coefficient of Variation	0.668					Skewness	0.0744
1276												
1277	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1278	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1279	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1280	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1281												
1282	<b>Normal GOF Test</b>											
1283					Shapiro Wilk Test Statistic	0.927					<b>Shapiro Wilk GOF Test</b>	
1284					5% Shapiro Wilk Critical Value	0.829					Data appear Normal at 5% Significance Level	
1285					Lilliefors Test Statistic	0.13					<b>Lilliefors GOF Test</b>	
1286					5% Lilliefors Critical Value	0.274					Data appear Normal at 5% Significance Level	
1287	<b>Data appear Normal at 5% Significance Level</b>											
1288												
1289	<b>Assuming Normal Distribution</b>											
1290	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
1291					95% Student's-t UCL	0.699					95% Adjusted-CLT UCL (Chen-1995)	0.678
1292											95% Modified-t UCL (Johnson-1978)	0.7
1293												
1294	<b>Gamma GOF Test</b>											
1295					A-D Test Statistic	0.372					<b>Anderson-Darling Gamma GOF Test</b>	
1296					5% A-D Critical Value	0.733					Detected data appear Gamma Distributed at 5% Significance Level	
1297					K-S Test Statistic	0.213					<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
1298					5% K-S Critical Value	0.284					Detected data appear Gamma Distributed at 5% Significance Level	
1299	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1300												
1301	<b>Gamma Statistics</b>											
1302					k hat (MLE)	1.655					k star (bias corrected MLE)	1.177
1303					Theta hat (MLE)	0.299					Theta star (bias corrected MLE)	0.42
1304					nu hat (MLE)	29.78					nu star (bias corrected)	21.19
1305					MLE Mean (bias corrected)	0.494					MLE Sd (bias corrected)	0.456
1306											Approximate Chi Square Value (0.05)	11.73
1307					Adjusted Level of Significance	0.0231					Adjusted Chi Square Value	10.28
1308												
1309	<b>Assuming Gamma Distribution</b>											
1310					95% Approximate Gamma UCL (use when n>=50))	0.893					95% Adjusted Gamma UCL (use when n<50)	1.019
1311												
1312	<b>Lognormal GOF Test</b>											
1313					Shapiro Wilk Test Statistic	0.877					<b>Shapiro Wilk Lognormal GOF Test</b>	
1314					5% Shapiro Wilk Critical Value	0.829					Data appear Lognormal at 5% Significance Level	
1315					Lilliefors Test Statistic	0.251					<b>Lilliefors Lognormal GOF Test</b>	
1316					5% Lilliefors Critical Value	0.274					Data appear Lognormal at 5% Significance Level	
1317	<b>Data appear Lognormal at 5% Significance Level</b>											
1318												
1319	<b>Lognormal Statistics</b>											
1320					Minimum of Logged Data	-2.996					Mean of logged Data	-1.036
1321					Maximum of Logged Data	-0.0726					SD of logged Data	1.011
1322												
1323	<b>Assuming Lognormal Distribution</b>											
1324					95% H-UCL	1.899					90% Chebyshev (MVUE) UCL	1.123
1325					95% Chebyshev (MVUE) UCL	1.383					97.5% Chebyshev (MVUE) UCL	1.744

	A	B	C	D	E	F	G	H	I	J	K	L	
1326	99% Chebyshev (MVUE) UCL					2.454							
1327													
1328	<b>Nonparametric Distribution Free UCL Statistics</b>												
1329	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
1330													
1331	<b>Nonparametric Distribution Free UCLs</b>												
1332	95% CLT UCL				0.675	95% Jackknife UCL				0.699			
1333	95% Standard Bootstrap UCL				0.667	95% Bootstrap-t UCL				0.703			
1334	95% Hall's Bootstrap UCL				0.677	95% Percentile Bootstrap UCL				0.668			
1335	95% BCA Bootstrap UCL				0.647								
1336	90% Chebyshev(Mean, Sd) UCL				0.825	95% Chebyshev(Mean, Sd) UCL				0.974			
1337	97.5% Chebyshev(Mean, Sd) UCL				1.182	99% Chebyshev(Mean, Sd) UCL				1.589			
1338													
1339	<b>Suggested UCL to Use</b>												
1340	95% Student's-t UCL				0.699								
1341													
1342	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1343	Recommendations are based upon data size, data distribution, and skewness.												
1344	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1345	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
1346													
1347													
1348	<b>Aroclor 1260</b>												
1349													
1350	<b>General Statistics</b>												
1351	Total Number of Observations				23	Number of Distinct Observations				19			
1352						Number of Missing Observations				0			
1353	Minimum				0.023	Mean				0.147			
1354	Maximum				0.42	Median				0.12			
1355	SD				0.121	Std. Error of Mean				0.0253			
1356	Coefficient of Variation				0.824	Skewness				1.153			
1357													
1358	<b>Normal GOF Test</b>												
1359	Shapiro Wilk Test Statistic				0.849	<b>Shapiro Wilk GOF Test</b>							
1360	5% Shapiro Wilk Critical Value				0.914	Data Not Normal at 5% Significance Level							
1361	Lilliefors Test Statistic				0.209	<b>Lilliefors GOF Test</b>							
1362	5% Lilliefors Critical Value				0.18	Data Not Normal at 5% Significance Level							
1363	<b>Data Not Normal at 5% Significance Level</b>												
1364													
1365	<b>Assuming Normal Distribution</b>												
1366	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>							
1367	95% Student's-t UCL				0.191	95% Adjusted-CLT UCL (Chen-1995)				0.195			
1368						95% Modified-t UCL (Johnson-1978)				0.192			
1369													
1370	<b>Gamma GOF Test</b>												
1371	A-D Test Statistic				0.319	<b>Anderson-Darling Gamma GOF Test</b>							
1372	5% A-D Critical Value				0.759	Detected data appear Gamma Distributed at 5% Significance Level							
1373	K-S Test Statistic				0.108	<b>Kolmogorov-Smirnov Gamma GOF Test</b>							
1374	5% K-S Critical Value				0.185	Detected data appear Gamma Distributed at 5% Significance Level							
1375	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
1376													
1377	<b>Gamma Statistics</b>												
1378	k hat (MLE)				1.622	k star (bias corrected MLE)				1.439			



	A	B	C	D	E	F	G	H	I	J	K	L
1379	Theta hat (MLE)				0.0908	Theta star (bias corrected MLE)				0.102		
1380	nu hat (MLE)				74.61	nu star (bias corrected)				66.22		
1381	MLE Mean (bias corrected)				0.147	MLE Sd (bias corrected)				0.123		
1382					Approximate Chi Square Value (0.05)				48.49			
1383	Adjusted Level of Significance				0.0389	Adjusted Chi Square Value				47.39		
1384												
1385	<b>Assuming Gamma Distribution</b>											
1386	95% Approximate Gamma UCL (use when n>=50)				0.201	95% Adjusted Gamma UCL (use when n<50)				0.206		
1387												
1388	<b>Lognormal GOF Test</b>											
1389	Shapiro Wilk Test Statistic				0.96	<b>Shapiro Wilk Lognormal GOF Test</b>						
1390	5% Shapiro Wilk Critical Value				0.914	Data appear Lognormal at 5% Significance Level						
1391	Lilliefors Test Statistic				0.0826	<b>Lilliefors Lognormal GOF Test</b>						
1392	5% Lilliefors Critical Value				0.18	Data appear Lognormal at 5% Significance Level						
1393	<b>Data appear Lognormal at 5% Significance Level</b>											
1394												
1395	<b>Lognormal Statistics</b>											
1396	Minimum of Logged Data				-3.772	Mean of logged Data				-2.255		
1397	Maximum of Logged Data				-0.868	SD of logged Data				0.878		
1398												
1399	<b>Assuming Lognormal Distribution</b>											
1400	95% H-UCL				0.24	90% Chebyshev (MVUE) UCL				0.242		
1401	95% Chebyshev (MVUE) UCL				0.284	97.5% Chebyshev (MVUE) UCL				0.342		
1402	99% Chebyshev (MVUE) UCL				0.455							
1403												
1404	<b>Nonparametric Distribution Free UCL Statistics</b>											
1405	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
1406												
1407	<b>Nonparametric Distribution Free UCLs</b>											
1408	95% CLT UCL				0.189	95% Jackknife UCL				0.191		
1409	95% Standard Bootstrap UCL				0.187	95% Bootstrap-t UCL				0.202		
1410	95% Hall's Bootstrap UCL				0.192	95% Percentile Bootstrap UCL				0.189		
1411	95% BCA Bootstrap UCL				0.198							
1412	90% Chebyshev(Mean, Sd) UCL				0.223	95% Chebyshev(Mean, Sd) UCL				0.257		
1413	97.5% Chebyshev(Mean, Sd) UCL				0.305	99% Chebyshev(Mean, Sd) UCL				0.399		
1414												
1415	<b>Suggested UCL to Use</b>											
1416	95% Adjusted Gamma UCL				0.206							
1417												
1418	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1419	Recommendations are based upon data size, data distribution, and skewness.											
1420	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1421	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1422												
1423												
1424	<b>Aldrin</b>											
1425												
1426	<b>General Statistics</b>											
1427	Total Number of Observations				2	Number of Distinct Observations				2		
1428						Number of Missing Observations				0		
1429	Minimum				0.0062	Mean				0.00635		
1430	Maximum				0.0065	Median				0.00635		
1431												

	A	B	C	D	E	F	G	H	I	J	K	L
1432	<b>Warning: This data set only has 2 observations!</b>											
1433	<b>Data set is too small to compute reliable and meaningful statistics and estimates!</b>											
1434	<b>The data set for variable Aldrin was not processed!</b>											
1435												
1436	<b>It is suggested to collect at least 8 to 10 observations before using these statistical methods!</b>											
1437	<b>If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.</b>											
1438												
1439												
1440	<b>4,4'-DDT (p,p'-DDT)</b>											
1441												
1442	<b>General Statistics</b>											
1443	Total Number of Observations				42		Number of Distinct Observations				32	
1444	Number of Detects				20		Number of Non-Detects				22	
1445	Number of Distinct Detects				18		Number of Distinct Non-Detects				15	
1446	Minimum Detect				0.0053		Minimum Non-Detect				0.0045	
1447	Maximum Detect				0.18		Maximum Non-Detect				0.0098	
1448	Variance Detects				0.00162		Percent Non-Detects				52.38%	
1449	Mean Detects				0.035		SD Detects				0.0402	
1450	Median Detects				0.0205		CV Detects				1.149	
1451	Skewness Detects				2.667		Kurtosis Detects				8.901	
1452	Mean of Logged Detects				-3.841		SD of Logged Detects				1.013	
1453												
1454	<b>Normal GOF Test on Detects Only</b>											
1455	Shapiro Wilk Test Statistic				0.696		<b>Shapiro Wilk GOF Test</b>					
1456	5% Shapiro Wilk Critical Value				0.905		Detected Data Not Normal at 5% Significance Level					
1457	Lilliefors Test Statistic				0.23		<b>Lilliefors GOF Test</b>					
1458	5% Lilliefors Critical Value				0.192		Detected Data Not Normal at 5% Significance Level					
1459	<b>Detected Data Not Normal at 5% Significance Level</b>											
1460												
1461	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1462	KM Mean				0.0191		KM Standard Error of Mean				0.00491	
1463	KM SD				0.031		95% KM (BCA) UCL				0.0284	
1464	95% KM (t) UCL				0.0273		95% KM (Percentile Bootstrap) UCL				0.0276	
1465	95% KM (z) UCL				0.0271		95% KM Bootstrap t UCL				0.0332	
1466	90% KM Chebyshev UCL				0.0338		95% KM Chebyshev UCL				0.0405	
1467	97.5% KM Chebyshev UCL				0.0497		99% KM Chebyshev UCL				0.0679	
1468												
1469	<b>Gamma GOF Tests on Detected Observations Only</b>											
1470	A-D Test Statistic				0.527		<b>Anderson-Darling GOF Test</b>					
1471	5% A-D Critical Value				0.765		Detected data appear Gamma Distributed at 5% Significance Level					
1472	K-S Test Statistic				0.144		<b>Kolmogorov-Smirnov GOF</b>					
1473	5% K-S Critical Value				0.199		Detected data appear Gamma Distributed at 5% Significance Level					
1474	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1475												
1476	<b>Gamma Statistics on Detected Data Only</b>											
1477	k hat (MLE)				1.163		k star (bias corrected MLE)				1.022	
1478	Theta hat (MLE)				0.0301		Theta star (bias corrected MLE)				0.0342	
1479	nu hat (MLE)				46.51		nu star (bias corrected)				40.87	
1480	Mean (detects)				0.035							
1481												
1482	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1483	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1484	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											

	A	B	C	D	E	F	G	H	I	J	K	L
1485	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1486	This is especially true when the sample size is small.											
1487	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1488	Minimum				0.0053		Mean				0.0219	
1489	Maximum				0.18		Median				0.01	
1490	SD				0.0301		CV				1.377	
1491	k hat (MLE)				1.333		k star (bias corrected MLE)				1.254	
1492	Theta hat (MLE)				0.0164		Theta star (bias corrected MLE)				0.0175	
1493	nu hat (MLE)				112		nu star (bias corrected)				105.3	
1494	Adjusted Level of Significance ( $\beta$ )				0.0443							
1495	Approximate Chi Square Value (105.33, $\alpha$ )				82.64		Adjusted Chi Square Value (105.33, $\beta$ )				81.93	
1496	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.0279		95% Gamma Adjusted UCL (use when $n < 50$ )				0.0281	
1497												
1498	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1499	Mean (KM)				0.0191		SD (KM)				0.031	
1500	Variance (KM)				9.6079E-4		SE of Mean (KM)				0.00491	
1501	k hat (KM)				0.379		k star (KM)				0.367	
1502	nu hat (KM)				31.79		nu star (KM)				30.86	
1503	theta hat (KM)				0.0504		theta star (KM)				0.0519	
1504	80% gamma percentile (KM)				0.0304		90% gamma percentile (KM)				0.0546	
1505	95% gamma percentile (KM)				0.0816		99% gamma percentile (KM)				0.15	
1506												
1507	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1508	Approximate Chi Square Value (30.86, $\alpha$ )				19.17		Adjusted Chi Square Value (30.86, $\beta$ )				18.84	
1509	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.0307		95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.0312	
1510												
1511	<b>Lognormal GOF Test on Detected Observations Only</b>											
1512	Shapiro Wilk Test Statistic				0.947		<b>Shapiro Wilk GOF Test</b>					
1513	5% Shapiro Wilk Critical Value				0.905		Detected Data appear Lognormal at 5% Significance Level					
1514	Lilliefors Test Statistic				0.137		<b>Lilliefors GOF Test</b>					
1515	5% Lilliefors Critical Value				0.192		Detected Data appear Lognormal at 5% Significance Level					
1516	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1517												
1518	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1519	Mean in Original Scale				0.0176		Mean in Log Scale				-5.21	
1520	SD in Original Scale				0.0321		SD in Log Scale				1.527	
1521	95% t UCL (assumes normality of ROS data)				0.0259		95% Percentile Bootstrap UCL				0.0261	
1522	95% BCA Bootstrap UCL				0.0286		95% Bootstrap t UCL				0.0321	
1523	95% H-UCL (Log ROS)				0.0359							
1524												
1525	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1526	KM Mean (logged)				-4.649		KM Geo Mean				0.00957	
1527	KM SD (logged)				1.03		95% Critical H Value (KM-Log)				2.39	
1528	KM Standard Error of Mean (logged)				0.163		95% H-UCL (KM -Log)				0.0239	
1529	KM SD (logged)				1.03		95% Critical H Value (KM-Log)				2.39	
1530	KM Standard Error of Mean (logged)				0.163							
1531												
1532	<b>DL/2 Statistics</b>											
1533	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1534	Mean in Original Scale				0.0182		Mean in Log Scale				-4.892	
1535	SD in Original Scale				0.0318		SD in Log Scale				1.244	
1536	95% t UCL (Assumes normality)				0.0265		95% H-Stat UCL				0.0272	
1537	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1538												
1539	<b>Nonparametric Distribution Free UCL Statistics</b>											
1540	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1541												
1542	<b>Suggested UCL to Use</b>											
1543	95% KM Adjusted Gamma UCL				0.0312		95% GROS Adjusted Gamma UCL				0.0281	
1544												
1545	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1546	Recommendations are based upon data size, data distribution, and skewness.											
1547	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1548	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1549												
1550	<b>4,4-DDD (p,p-DDD)</b>											
1551												
1552	<b>General Statistics</b>											
1553	Total Number of Observations				50		Number of Distinct Observations				23	
1554	Number of Detects				1		Number of Non-Detects				49	
1555	Number of Distinct Detects				1		Number of Distinct Non-Detects				22	
1556												
1557	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>											
1558	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>											
1559												
1560	<b>The data set for variable 4,4-DDD (p,p-DDD) was not processed!</b>											
1561												
1562												
1563	<b>Endrin</b>											
1564												
1565	<b>General Statistics</b>											
1566	Total Number of Observations				44		Number of Distinct Observations				28	
1567	Number of Detects				16		Number of Non-Detects				28	
1568	Number of Distinct Detects				13		Number of Distinct Non-Detects				17	
1569	Minimum Detect				0.0062		Minimum Non-Detect				0.0055	
1570	Maximum Detect				0.044		Maximum Non-Detect				0.012	
1571	Variance Detects				1.5734E-4		Percent Non-Detects				63.64%	
1572	Mean Detects				0.0187		SD Detects				0.0125	
1573	Median Detects				0.014		CV Detects				0.673	
1574	Skewness Detects				0.961		Kurtosis Detects				-0.161	
1575	Mean of Logged Detects				-4.188		SD of Logged Detects				0.661	
1576												
1577	<b>Normal GOF Test on Detects Only</b>											
1578	Shapiro Wilk Test Statistic				0.847		<b>Shapiro Wilk GOF Test</b>					
1579	5% Shapiro Wilk Critical Value				0.887		Detected Data Not Normal at 5% Significance Level					
1580	Lilliefors Test Statistic				0.207		<b>Lilliefors GOF Test</b>					
1581	5% Lilliefors Critical Value				0.213		Detected Data appear Normal at 5% Significance Level					
1582	<b>Detected Data appear Approximate Normal at 5% Significance Level</b>											
1583												
1584	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1585	KM Mean				0.0104		KM Standard Error of Mean				0.0015	
1586	KM SD				0.00965		95% KM (BCA) UCL				0.0129	
1587	95% KM (t) UCL				0.0129		95% KM (Percentile Bootstrap) UCL				0.0127	
1588	95% KM (z) UCL				0.0128		95% KM Bootstrap t UCL				0.0139	
1589	90% KM Chebyshev UCL				0.0149		95% KM Chebyshev UCL				0.0169	
1590	97.5% KM Chebyshev UCL				0.0198		99% KM Chebyshev UCL				0.0253	

	A	B	C	D	E	F	G	H	I	J	K	L
1591												
1592	<b>Gamma GOF Tests on Detected Observations Only</b>											
1593	A-D Test Statistic				0.666		<b>Anderson-Darling GOF Test</b>					
1594	5% A-D Critical Value				0.747		Detected data appear Gamma Distributed at 5% Significance Level					
1595	K-S Test Statistic				0.192		<b>Kolmogorov-Smirnov GOF</b>					
1596	5% K-S Critical Value				0.217		Detected data appear Gamma Distributed at 5% Significance Level					
1597	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1598												
1599	<b>Gamma Statistics on Detected Data Only</b>											
1600	k hat (MLE)				2.579		k star (bias corrected MLE)				2.137	
1601	Theta hat (MLE)				0.00723		Theta star (bias corrected MLE)				0.00873	
1602	nu hat (MLE)				82.54		nu star (bias corrected)				68.4	
1603	Mean (detects)				0.0187							
1604												
1605	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1606	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1607	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1608	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1609	This is especially true when the sample size is small.											
1610	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1611	Minimum				0.0062		Mean				0.0131	
1612	Maximum				0.044		Median				0.01	
1613	SD				0.00852		CV				0.648	
1614	k hat (MLE)				4.264		k star (bias corrected MLE)				3.988	
1615	Theta hat (MLE)				0.00308		Theta star (bias corrected MLE)				0.0033	
1616	nu hat (MLE)				375.2		nu star (bias corrected)				350.9	
1617	Adjusted Level of Significance ( $\beta$ )				0.0445							
1618	Approximate Chi Square Value (350.95, $\alpha$ )				308.5		Adjusted Chi Square Value (350.95, $\beta$ )				307.2	
1619	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.015		95% Gamma Adjusted UCL (use when $n < 50$ )				0.015	
1620												
1621	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1622	Mean (KM)				0.0104		SD (KM)				0.00965	
1623	Variance (KM)				9.3091E-5		SE of Mean (KM)				0.0015	
1624	k hat (KM)				1.154		k star (KM)				1.09	
1625	nu hat (KM)				101.5		nu star (KM)				95.93	
1626	theta hat (KM)				0.00898		theta star (KM)				0.00951	
1627	80% gamma percentile (KM)				0.0166		90% gamma percentile (KM)				0.0234	
1628	95% gamma percentile (KM)				0.0301		99% gamma percentile (KM)				0.0457	
1629												
1630	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1631	Approximate Chi Square Value (95.93, $\alpha$ )				74.34		Adjusted Chi Square Value (95.93, $\beta$ )				73.7	
1632	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.0134		95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.0135	
1633												
1634	<b>Lognormal GOF Test on Detected Observations Only</b>											
1635	Shapiro Wilk Test Statistic				0.913		<b>Shapiro Wilk GOF Test</b>					
1636	5% Shapiro Wilk Critical Value				0.887		Detected Data appear Lognormal at 5% Significance Level					
1637	Lilliefors Test Statistic				0.173		<b>Lilliefors GOF Test</b>					
1638	5% Lilliefors Critical Value				0.213		Detected Data appear Lognormal at 5% Significance Level					
1639	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1640												
1641	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1642	Mean in Original Scale				0.00837		Mean in Log Scale				-5.381	
1643	SD in Original Scale				0.0108		SD in Log Scale				1.042	

	A	B	C	D	E	F	G	H	I	J	K	L
1644	95% t UCL (assumes normality of ROS data)					0.0111	95% Percentile Bootstrap UCL					0.0112
1645	95% BCA Bootstrap UCL					0.0114	95% Bootstrap t UCL					0.012
1646	95% H-UCL (Log ROS)					0.0116						
1647												
1648	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1649	KM Mean (logged)					-4.822	KM Geo Mean					0.00805
1650	KM SD (logged)					0.619	95% Critical H Value (KM-Log)					1.995
1651	KM Standard Error of Mean (logged)					0.0969	95% H-UCL (KM -Log)					0.0118
1652	KM SD (logged)					0.619	95% Critical H Value (KM-Log)					1.995
1653	KM Standard Error of Mean (logged)					0.0969						
1654												
1655	<b>DL/2 Statistics</b>											
1656	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1657	Mean in Original Scale					0.00903	Mean in Log Scale					-5.138
1658	SD in Original Scale					0.0105	SD in Log Scale					0.85
1659	95% t UCL (Assumes normality)					0.0117	95% H-Stat UCL					0.0112
1660	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1661												
1662	<b>Nonparametric Distribution Free UCL Statistics</b>											
1663	<b>Detected Data appear Approximate Normal Distributed at 5% Significance Level</b>											
1664												
1665	<b>Suggested UCL to Use</b>											
1666	95% KM (t) UCL					0.0129						
1667												
1668	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1669	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1670												
1671	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1672	Recommendations are based upon data size, data distribution, and skewness.											
1673	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1674	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1675												
1676												
1677	<b>Benzo(a)anthracene</b>											
1678												
1679	<b>General Statistics</b>											
1680	Total Number of Observations					27	Number of Distinct Observations					23
1681							Number of Missing Observations					0
1682	Minimum					0.14	Mean					2.312
1683	Maximum					12	Median					1.1
1684	SD					3.086	Std. Error of Mean					0.594
1685	Coefficient of Variation					1.335	Skewness					2.342
1686												
1687	<b>Normal GOF Test</b>											
1688	Shapiro Wilk Test Statistic					0.647	<b>Shapiro Wilk GOF Test</b>					
1689	5% Shapiro Wilk Critical Value					0.923	Data Not Normal at 5% Significance Level					
1690	Lilliefors Test Statistic					0.266	<b>Lilliefors GOF Test</b>					
1691	5% Lilliefors Critical Value					0.167	Data Not Normal at 5% Significance Level					
1692	<b>Data Not Normal at 5% Significance Level</b>											
1693												
1694	<b>Assuming Normal Distribution</b>											
1695	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
1696	95% Student's-t UCL					3.325	95% Adjusted-CLT UCL (Chen-1995)					3.575

	A	B	C	D	E	F	G	H	I	J	K	L
1697							95% Modified-t UCL (Johnson-1978)					3.37
1698												
1699	<b>Gamma GOF Test</b>											
1700	A-D Test Statistic				0.965	<b>Anderson-Darling Gamma GOF Test</b>						
1701	5% A-D Critical Value				0.776	Data Not Gamma Distributed at 5% Significance Level						
1702	K-S Test Statistic				0.158	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
1703	5% K-S Critical Value				0.173	Detected data appear Gamma Distributed at 5% Significance Level						
1704	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1705												
1706	<b>Gamma Statistics</b>											
1707	k hat (MLE)				0.937	k star (bias corrected MLE)					0.857	
1708	Theta hat (MLE)				2.468	Theta star (bias corrected MLE)					2.697	
1709	nu hat (MLE)				50.58	nu star (bias corrected)					46.3	
1710	MLE Mean (bias corrected)				2.312	MLE Sd (bias corrected)					2.497	
1711						Approximate Chi Square Value (0.05)					31.68	
1712	Adjusted Level of Significance				0.0401	Adjusted Chi Square Value					30.91	
1713												
1714	<b>Assuming Gamma Distribution</b>											
1715	95% Approximate Gamma UCL (use when n>=50)				3.379	95% Adjusted Gamma UCL (use when n<50)					3.463	
1716												
1717	<b>Lognormal GOF Test</b>											
1718	Shapiro Wilk Test Statistic				0.967	<b>Shapiro Wilk Lognormal GOF Test</b>						
1719	5% Shapiro Wilk Critical Value				0.923	Data appear Lognormal at 5% Significance Level						
1720	Lilliefors Test Statistic				0.0925	<b>Lilliefors Lognormal GOF Test</b>						
1721	5% Lilliefors Critical Value				0.167	Data appear Lognormal at 5% Significance Level						
1722	<b>Data appear Lognormal at 5% Significance Level</b>											
1723												
1724	<b>Lognormal Statistics</b>											
1725	Minimum of Logged Data				-1.966	Mean of logged Data					0.217	
1726	Maximum of Logged Data				2.485	SD of logged Data					1.123	
1727												
1728	<b>Assuming Lognormal Distribution</b>											
1729	95% H-UCL				4.213	90% Chebyshev (MVUE) UCL					3.956	
1730	95% Chebyshev (MVUE) UCL				4.729	97.5% Chebyshev (MVUE) UCL					5.801	
1731	99% Chebyshev (MVUE) UCL				7.907							
1732												
1733	<b>Nonparametric Distribution Free UCL Statistics</b>											
1734	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
1735												
1736	<b>Nonparametric Distribution Free UCLs</b>											
1737	95% CLT UCL				3.289	95% Jackknife UCL					3.325	
1738	95% Standard Bootstrap UCL				3.293	95% Bootstrap-t UCL					4.133	
1739	95% Hall's Bootstrap UCL				3.682	95% Percentile Bootstrap UCL					3.314	
1740	95% BCA Bootstrap UCL				3.619							
1741	90% Chebyshev(Mean, Sd) UCL				4.094	95% Chebyshev(Mean, Sd) UCL					4.901	
1742	97.5% Chebyshev(Mean, Sd) UCL				6.021	99% Chebyshev(Mean, Sd) UCL					8.221	
1743												
1744	<b>Suggested UCL to Use</b>											
1745	95% Adjusted Gamma UCL				3.463							
1746												
1747	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1748	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1749												

	A	B	C	D	E	F	G	H	I	J	K	L
1750	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1751	Recommendations are based upon data size, data distribution, and skewness.											
1752	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1753	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1754												
1755												
1756	<b>Benzo(b)fluoranthene</b>											
1757												
1758	<b>General Statistics</b>											
1759	Total Number of Observations				28		Number of Distinct Observations				23	
1760							Number of Missing Observations				0	
1761	Minimum				0.1		Mean				2.398	
1762	Maximum				11		Median				1.25	
1763	SD				2.893		Std. Error of Mean				0.547	
1764	Coefficient of Variation				1.207		Skewness				2.147	
1765												
1766	<b>Normal GOF Test</b>											
1767	Shapiro Wilk Test Statistic				0.698		<b>Shapiro Wilk GOF Test</b>					
1768	5% Shapiro Wilk Critical Value				0.924		Data Not Normal at 5% Significance Level					
1769	Lilliefors Test Statistic				0.26		<b>Lilliefors GOF Test</b>					
1770	5% Lilliefors Critical Value				0.164		Data Not Normal at 5% Significance Level					
1771	<b>Data Not Normal at 5% Significance Level</b>											
1772												
1773	<b>Assuming Normal Distribution</b>											
1774	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
1775	95% Student's-t UCL				3.329		95% Adjusted-CLT UCL (Chen-1995)				3.534	
1776							95% Modified-t UCL (Johnson-1978)				3.366	
1777												
1778	<b>Gamma GOF Test</b>											
1779	A-D Test Statistic				0.675		<b>Anderson-Darling Gamma GOF Test</b>					
1780	5% A-D Critical Value				0.774		Detected data appear Gamma Distributed at 5% Significance Level					
1781	K-S Test Statistic				0.155		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
1782	5% K-S Critical Value				0.17		Detected data appear Gamma Distributed at 5% Significance Level					
1783	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1784												
1785	<b>Gamma Statistics</b>											
1786	k hat (MLE)				0.99		k star (bias corrected MLE)				0.908	
1787	Theta hat (MLE)				2.422		Theta star (bias corrected MLE)				2.641	
1788	nu hat (MLE)				55.45		nu star (bias corrected)				50.84	
1789	MLE Mean (bias corrected)				2.398		MLE Sd (bias corrected)				2.517	
1790							Approximate Chi Square Value (0.05)				35.47	
1791	Adjusted Level of Significance				0.0404		Adjusted Chi Square Value				34.67	
1792												
1793	<b>Assuming Gamma Distribution</b>											
1794	95% Approximate Gamma UCL (use when n>=50)				3.437		95% Adjusted Gamma UCL (use when n<50)				3.516	
1795												
1796	<b>Lognormal GOF Test</b>											
1797	Shapiro Wilk Test Statistic				0.97		<b>Shapiro Wilk Lognormal GOF Test</b>					
1798	5% Shapiro Wilk Critical Value				0.924		Data appear Lognormal at 5% Significance Level					
1799	Lilliefors Test Statistic				0.0976		<b>Lilliefors Lognormal GOF Test</b>					
1800	5% Lilliefors Critical Value				0.164		Data appear Lognormal at 5% Significance Level					
1801	<b>Data appear Lognormal at 5% Significance Level</b>											
1802												



	A	B	C	D	E	F	G	H	I	J	K	L
1803	<b>Lognormal Statistics</b>											
1804	Minimum of Logged Data				-2.303		Mean of logged Data				0.291	
1805	Maximum of Logged Data				2.398		SD of logged Data				1.145	
1806												
1807	<b>Assuming Lognormal Distribution</b>											
1808	95% H-UCL				4.612		90% Chebyshev (MVUE) UCL				4.385	
1809	95% Chebyshev (MVUE) UCL				5.245		97.5% Chebyshev (MVUE) UCL				6.439	
1810	99% Chebyshev (MVUE) UCL				8.785							
1811												
1812	<b>Nonparametric Distribution Free UCL Statistics</b>											
1813	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
1814												
1815	<b>Nonparametric Distribution Free UCLs</b>											
1816	95% CLT UCL				3.297		95% Jackknife UCL				3.329	
1817	95% Standard Bootstrap UCL				3.256		95% Bootstrap-t UCL				3.964	
1818	95% Hall's Bootstrap UCL				4.085		95% Percentile Bootstrap UCL				3.397	
1819	95% BCA Bootstrap UCL				3.566							
1820	90% Chebyshev(Mean, Sd) UCL				4.038		95% Chebyshev(Mean, Sd) UCL				4.781	
1821	97.5% Chebyshev(Mean, Sd) UCL				5.812		99% Chebyshev(Mean, Sd) UCL				7.838	
1822												
1823	<b>Suggested UCL to Use</b>											
1824	95% Adjusted Gamma UCL				3.516							
1825												
1826	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1827	Recommendations are based upon data size, data distribution, and skewness.											
1828	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1829	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1830												
1831												
1832	<b>Benzo(k)fluoranthene</b>											
1833												
1834	<b>General Statistics</b>											
1835	Total Number of Observations				22		Number of Distinct Observations				19	
1836							Number of Missing Observations				0	
1837	Minimum				0.17		Mean				1.081	
1838	Maximum				5.1		Median				0.565	
1839	SD				1.319		Std. Error of Mean				0.281	
1840	Coefficient of Variation				1.22		Skewness				2.343	
1841												
1842	<b>Normal GOF Test</b>											
1843	Shapiro Wilk Test Statistic				0.645		<b>Shapiro Wilk GOF Test</b>					
1844	5% Shapiro Wilk Critical Value				0.911		Data Not Normal at 5% Significance Level					
1845	Lilliefors Test Statistic				0.303		<b>Lilliefors GOF Test</b>					
1846	5% Lilliefors Critical Value				0.184		Data Not Normal at 5% Significance Level					
1847	<b>Data Not Normal at 5% Significance Level</b>											
1848												
1849	<b>Assuming Normal Distribution</b>											
1850	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
1851	95% Student's-t UCL				1.565		95% Adjusted-CLT UCL (Chen-1995)				1.694	
1852							95% Modified-t UCL (Johnson-1978)				1.589	
1853												
1854	<b>Gamma GOF Test</b>											
1855	A-D Test Statistic				1.21		<b>Anderson-Darling Gamma GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L	
1856				5% A-D Critical Value		0.766						Data Not Gamma Distributed at 5% Significance Level	
1857				K-S Test Statistic		0.199						<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
1858				5% K-S Critical Value		0.19						Data Not Gamma Distributed at 5% Significance Level	
1859				<b>Data Not Gamma Distributed at 5% Significance Level</b>									
1860													
1861				<b>Gamma Statistics</b>									
1862				k hat (MLE)		1.218						k star (bias corrected MLE)	1.082
1863				Theta hat (MLE)		0.888						Theta star (bias corrected MLE)	0.999
1864				nu hat (MLE)		53.6						nu star (bias corrected)	47.62
1865				MLE Mean (bias corrected)		1.081						MLE Sd (bias corrected)	1.039
1866												Approximate Chi Square Value (0.05)	32.78
1867				Adjusted Level of Significance		0.0386						Adjusted Chi Square Value	31.86
1868													
1869				<b>Assuming Gamma Distribution</b>									
1870				95% Approximate Gamma UCL (use when n>=50))		1.571						95% Adjusted Gamma UCL (use when n<50)	1.616
1871													
1872				<b>Lognormal GOF Test</b>									
1873				Shapiro Wilk Test Statistic		0.937						<b>Shapiro Wilk Lognormal GOF Test</b>	
1874				5% Shapiro Wilk Critical Value		0.911						Data appear Lognormal at 5% Significance Level	
1875				Lilliefors Test Statistic		0.146						<b>Lilliefors Lognormal GOF Test</b>	
1876				5% Lilliefors Critical Value		0.184						Data appear Lognormal at 5% Significance Level	
1877				<b>Data appear Lognormal at 5% Significance Level</b>									
1878													
1879				<b>Lognormal Statistics</b>									
1880				Minimum of Logged Data		-1.772						Mean of logged Data	-0.385
1881				Maximum of Logged Data		1.629						SD of logged Data	0.91
1882													
1883				<b>Assuming Lognormal Distribution</b>									
1884				95% H-UCL		1.677						90% Chebyshev (MVUE) UCL	1.65
1885				95% Chebyshev (MVUE) UCL		1.944						97.5% Chebyshev (MVUE) UCL	2.35
1886				99% Chebyshev (MVUE) UCL		3.15							
1887													
1888				<b>Nonparametric Distribution Free UCL Statistics</b>									
1889				<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>									
1890													
1891				<b>Nonparametric Distribution Free UCLs</b>									
1892				95% CLT UCL		1.544						95% Jackknife UCL	1.565
1893				95% Standard Bootstrap UCL		1.545						95% Bootstrap-t UCL	2.228
1894				95% Hall's Bootstrap UCL		3.293						95% Percentile Bootstrap UCL	1.56
1895				95% BCA Bootstrap UCL		1.698							
1896				90% Chebyshev(Mean, Sd) UCL		1.925						95% Chebyshev(Mean, Sd) UCL	2.308
1897				97.5% Chebyshev(Mean, Sd) UCL		2.838						99% Chebyshev(Mean, Sd) UCL	3.88
1898													
1899				<b>Suggested UCL to Use</b>									
1900				95% H-UCL		1.677							
1901													
1902				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
1903				Recommendations are based upon data size, data distribution, and skewness.									
1904				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).									
1905				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.									
1906													
1907				<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>									
1908				<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>									

	A	B	C	D	E	F	G	H	I	J	K	L	
1909	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.												
1910	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.												
1911													
1912													
1913	Benzo(a)pyrene												
1914													
1915	<b>General Statistics</b>												
1916	Total Number of Observations				27		Number of Distinct Observations				25		
1917									Number of Missing Observations				0
1918	Minimum				0.11		Mean				1.997		
1919	Maximum				9.2		Median				1.1		
1920	SD				2.399		Std. Error of Mean				0.462		
1921	Coefficient of Variation				1.201		Skewness				2.158		
1922													
1923	<b>Normal GOF Test</b>												
1924	Shapiro Wilk Test Statistic				0.689		<b>Shapiro Wilk GOF Test</b>						
1925	5% Shapiro Wilk Critical Value				0.923		Data Not Normal at 5% Significance Level						
1926	Lilliefors Test Statistic				0.261		<b>Lilliefors GOF Test</b>						
1927	5% Lilliefors Critical Value				0.167		Data Not Normal at 5% Significance Level						
1928	<b>Data Not Normal at 5% Significance Level</b>												
1929													
1930	<b>Assuming Normal Distribution</b>												
1931	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
1932	95% Student's-t UCL				2.785		95% Adjusted-CLT UCL (Chen-1995)				2.962		
1933									95% Modified-t UCL (Johnson-1978)				2.817
1934													
1935	<b>Gamma GOF Test</b>												
1936	A-D Test Statistic				0.78		<b>Anderson-Darling Gamma GOF Test</b>						
1937	5% A-D Critical Value				0.772		Data Not Gamma Distributed at 5% Significance Level						
1938	K-S Test Statistic				0.159		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
1939	5% K-S Critical Value				0.173		Detected data appear Gamma Distributed at 5% Significance Level						
1940	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>												
1941													
1942	<b>Gamma Statistics</b>												
1943	k hat (MLE)				1.056		k star (bias corrected MLE)				0.963		
1944	Theta hat (MLE)				1.892		Theta star (bias corrected MLE)				2.074		
1945	nu hat (MLE)				57.02		nu star (bias corrected)				52.02		
1946	MLE Mean (bias corrected)				1.997		MLE Sd (bias corrected)				2.035		
1947									Approximate Chi Square Value (0.05)				36.45
1948	Adjusted Level of Significance				0.0401		Adjusted Chi Square Value				35.62		
1949													
1950	<b>Assuming Gamma Distribution</b>												
1951	95% Approximate Gamma UCL (use when n>=50)				2.85		95% Adjusted Gamma UCL (use when n<50)				2.917		
1952													
1953	<b>Lognormal GOF Test</b>												
1954	Shapiro Wilk Test Statistic				0.971		<b>Shapiro Wilk Lognormal GOF Test</b>						
1955	5% Shapiro Wilk Critical Value				0.923		Data appear Lognormal at 5% Significance Level						
1956	Lilliefors Test Statistic				0.0982		<b>Lilliefors Lognormal GOF Test</b>						
1957	5% Lilliefors Critical Value				0.167		Data appear Lognormal at 5% Significance Level						
1958	<b>Data appear Lognormal at 5% Significance Level</b>												
1959													
1960	<b>Lognormal Statistics</b>												
1961	Minimum of Logged Data				-2.207		Mean of logged Data				0.149		

	A	B	C	D	E	F	G	H	I	J	K	L
1962	Maximum of Logged Data					2.219	SD of logged Data					1.075
1963												
1964	<b>Assuming Lognormal Distribution</b>											
1965	95% H-UCL				3.591	90% Chebyshev (MVUE) UCL					3.442	
1966	95% Chebyshev (MVUE) UCL				4.094	97.5% Chebyshev (MVUE) UCL					4.999	
1967	99% Chebyshev (MVUE) UCL				6.776							
1968												
1969	<b>Nonparametric Distribution Free UCL Statistics</b>											
1970	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
1971												
1972	<b>Nonparametric Distribution Free UCLs</b>											
1973	95% CLT UCL				2.757	95% Jackknife UCL					2.785	
1974	95% Standard Bootstrap UCL				2.726	95% Bootstrap-t UCL					3.222	
1975	95% Hall's Bootstrap UCL				3.087	95% Percentile Bootstrap UCL					2.782	
1976	95% BCA Bootstrap UCL				2.999							
1977	90% Chebyshev(Mean, Sd) UCL				3.382	95% Chebyshev(Mean, Sd) UCL					4.01	
1978	97.5% Chebyshev(Mean, Sd) UCL				4.88	99% Chebyshev(Mean, Sd) UCL					6.59	
1979												
1980	<b>Suggested UCL to Use</b>											
1981	95% Adjusted Gamma UCL				2.917							
1982												
1983	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1984	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1985												
1986	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1987	Recommendations are based upon data size, data distribution, and skewness.											
1988	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1989	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1990												
1991												
1992	<b>Chrysene</b>											
1993												
1994	<b>General Statistics</b>											
1995	Total Number of Observations				28	Number of Distinct Observations					26	
1996						Number of Missing Observations					0	
1997	Minimum				0.078	Mean					2.015	
1998	Maximum				9.9	Median					1.05	
1999	SD				2.53	Std. Error of Mean					0.478	
2000	Coefficient of Variation				1.255	Skewness					2.22	
2001												
2002	<b>Normal GOF Test</b>											
2003	Shapiro Wilk Test Statistic				0.679	<b>Shapiro Wilk GOF Test</b>						
2004	5% Shapiro Wilk Critical Value				0.924	Data Not Normal at 5% Significance Level						
2005	Lilliefors Test Statistic				0.261	<b>Lilliefors GOF Test</b>						
2006	5% Lilliefors Critical Value				0.164	Data Not Normal at 5% Significance Level						
2007	<b>Data Not Normal at 5% Significance Level</b>											
2008												
2009	<b>Assuming Normal Distribution</b>											
2010	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>						
2011	95% Student's-t UCL				2.83	95% Adjusted-CLT UCL (Chen-1995)					3.016	
2012						95% Modified-t UCL (Johnson-1978)					2.863	
2013												
2014	<b>Gamma GOF Test</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
2015	A-D Test Statistic					0.729	Anderson-Darling Gamma GOF Test					
2016	5% A-D Critical Value					0.776	Detected data appear Gamma Distributed at 5% Significance Level					
2017	K-S Test Statistic					0.124	Kolmogorov-Smirnov Gamma GOF Test					
2018	5% K-S Critical Value					0.17	Detected data appear Gamma Distributed at 5% Significance Level					
2019	Detected data appear Gamma Distributed at 5% Significance Level											
2020												
2021	Gamma Statistics											
2022	k hat (MLE)					0.96	k star (bias corrected MLE)					0.881
2023	Theta hat (MLE)					2.1	Theta star (bias corrected MLE)					2.288
2024	nu hat (MLE)					53.75	nu star (bias corrected)					49.32
2025	MLE Mean (bias corrected)					2.015	MLE Sd (bias corrected)					2.147
2026							Approximate Chi Square Value (0.05)					34.2
2027	Adjusted Level of Significance					0.0404	Adjusted Chi Square Value					33.42
2028												
2029	Assuming Gamma Distribution											
2030	95% Approximate Gamma UCL (use when n>=50)					2.906	95% Adjusted Gamma UCL (use when n<50)					2.974
2031												
2032	Lognormal GOF Test											
2033	Shapiro Wilk Test Statistic					0.972	Shapiro Wilk Lognormal GOF Test					
2034	5% Shapiro Wilk Critical Value					0.924	Data appear Lognormal at 5% Significance Level					
2035	Lilliefors Test Statistic					0.126	Lilliefors Lognormal GOF Test					
2036	5% Lilliefors Critical Value					0.164	Data appear Lognormal at 5% Significance Level					
2037	Data appear Lognormal at 5% Significance Level											
2038												
2039	Lognormal Statistics											
2040	Minimum of Logged Data					-2.551	Mean of logged Data					0.0964
2041	Maximum of Logged Data					2.293	SD of logged Data					1.156
2042												
2043	Assuming Lognormal Distribution											
2044	95% H-UCL					3.873	90% Chebyshev (MVUE) UCL					3.667
2045	95% Chebyshev (MVUE) UCL					4.391	97.5% Chebyshev (MVUE) UCL					5.395
2046	99% Chebyshev (MVUE) UCL					7.369						
2047												
2048	Nonparametric Distribution Free UCL Statistics											
2049	Data appear to follow a Discernible Distribution at 5% Significance Level											
2050												
2051	Nonparametric Distribution Free UCLs											
2052	95% CLT UCL					2.802	95% Jackknife UCL					2.83
2053	95% Standard Bootstrap UCL					2.789	95% Bootstrap-t UCL					3.284
2054	95% Hall's Bootstrap UCL					3.06	95% Percentile Bootstrap UCL					2.844
2055	95% BCA Bootstrap UCL					3.008						
2056	90% Chebyshev(Mean, Sd) UCL					3.449	95% Chebyshev(Mean, Sd) UCL					4.099
2057	97.5% Chebyshev(Mean, Sd) UCL					5.001	99% Chebyshev(Mean, Sd) UCL					6.772
2058												
2059	Suggested UCL to Use											
2060	95% Adjusted Gamma UCL					2.974						
2061												
2062	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2063	Recommendations are based upon data size, data distribution, and skewness.											
2064	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2065	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2066												
2067												

	A	B	C	D	E	F	G	H	I	J	K	L	
2068	<b>Dibenz(a,h)anthracene</b>												
2069													
2070	<b>General Statistics</b>												
2071	Total Number of Observations				15		Number of Distinct Observations				14		
2072									Number of Missing Observations				0
2073	Minimum				0.1		Mean				0.475		
2074	Maximum				1.6		Median				0.26		
2075	SD				0.478		Std. Error of Mean				0.123		
2076	Coefficient of Variation				1.007		Skewness				1.531		
2077													
2078	<b>Normal GOF Test</b>												
2079	Shapiro Wilk Test Statistic				0.765		<b>Shapiro Wilk GOF Test</b>						
2080	5% Shapiro Wilk Critical Value				0.881		Data Not Normal at 5% Significance Level						
2081	Lilliefors Test Statistic				0.266		<b>Lilliefors GOF Test</b>						
2082	5% Lilliefors Critical Value				0.22		Data Not Normal at 5% Significance Level						
2083	<b>Data Not Normal at 5% Significance Level</b>												
2084													
2085	<b>Assuming Normal Distribution</b>												
2086	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
2087	95% Student's-t UCL				0.692		95% Adjusted-CLT UCL (Chen-1995)				0.73		
2088									95% Modified-t UCL (Johnson-1978)				0.7
2089													
2090	<b>Gamma GOF Test</b>												
2091	A-D Test Statistic				0.769		<b>Anderson-Darling Gamma GOF Test</b>						
2092	5% A-D Critical Value				0.756		Data Not Gamma Distributed at 5% Significance Level						
2093	K-S Test Statistic				0.219		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
2094	5% K-S Critical Value				0.226		Detected data appear Gamma Distributed at 5% Significance Level						
2095	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>												
2096													
2097	<b>Gamma Statistics</b>												
2098	k hat (MLE)				1.359		k star (bias corrected MLE)				1.132		
2099	Theta hat (MLE)				0.349		Theta star (bias corrected MLE)				0.419		
2100	nu hat (MLE)				40.78		nu star (bias corrected)				33.95		
2101	MLE Mean (bias corrected)				0.475		MLE Sd (bias corrected)				0.446		
2102									Approximate Chi Square Value (0.05)				21.63
2103	Adjusted Level of Significance				0.0324		Adjusted Chi Square Value				20.42		
2104													
2105	<b>Assuming Gamma Distribution</b>												
2106	95% Approximate Gamma UCL (use when n>=50)				0.745		95% Adjusted Gamma UCL (use when n<50)				0.789		
2107													
2108	<b>Lognormal GOF Test</b>												
2109	Shapiro Wilk Test Statistic				0.916		<b>Shapiro Wilk Lognormal GOF Test</b>						
2110	5% Shapiro Wilk Critical Value				0.881		Data appear Lognormal at 5% Significance Level						
2111	Lilliefors Test Statistic				0.177		<b>Lilliefors Lognormal GOF Test</b>						
2112	5% Lilliefors Critical Value				0.22		Data appear Lognormal at 5% Significance Level						
2113	<b>Data appear Lognormal at 5% Significance Level</b>												
2114													
2115	<b>Lognormal Statistics</b>												
2116	Minimum of Logged Data				-2.303		Mean of logged Data				-1.156		
2117	Maximum of Logged Data				0.47		SD of logged Data				0.91		
2118													
2119	<b>Assuming Lognormal Distribution</b>												
2120	95% H-UCL				0.897		90% Chebyshev (MVUE) UCL				0.809		

	A	B	C	D	E	F	G	H	I	J	K	L
2121			95% Chebyshev (MVUE) UCL			0.968			97.5% Chebyshev (MVUE) UCL			1.188
2122			99% Chebyshev (MVUE) UCL			1.62						
2123												
2124	<b>Nonparametric Distribution Free UCL Statistics</b>											
2125	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
2126												
2127	<b>Nonparametric Distribution Free UCLs</b>											
2128			95% CLT UCL			0.678			95% Jackknife UCL			0.692
2129			95% Standard Bootstrap UCL			0.668			95% Bootstrap-t UCL			0.797
2130			95% Hall's Bootstrap UCL			0.799			95% Percentile Bootstrap UCL			0.686
2131			95% BCA Bootstrap UCL			0.744						
2132			90% Chebyshev(Mean, Sd) UCL			0.845			95% Chebyshev(Mean, Sd) UCL			1.013
2133			97.5% Chebyshev(Mean, Sd) UCL			1.245			99% Chebyshev(Mean, Sd) UCL			1.702
2134												
2135	<b>Suggested UCL to Use</b>											
2136			95% Adjusted Gamma UCL			0.789						
2137												
2138	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
2139	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
2140												
2141	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2142	Recommendations are based upon data size, data distribution, and skewness.											
2143	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2144	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2145												
2146												
2147	<b>Indeno(1,2,3-cd)pyrene</b>											
2148												
2149	<b>General Statistics</b>											
2150			Total Number of Observations			27			Number of Distinct Observations			25
2151									Number of Missing Observations			0
2152			Minimum			0.079			Mean			1.251
2153			Maximum			6.3			Median			0.63
2154			SD			1.505			Std. Error of Mean			0.29
2155			Coefficient of Variation			1.203			Skewness			2.223
2156												
2157	<b>Normal GOF Test</b>											
2158			Shapiro Wilk Test Statistic			0.684			<b>Shapiro Wilk GOF Test</b>			
2159			5% Shapiro Wilk Critical Value			0.923			Data Not Normal at 5% Significance Level			
2160			Lilliefors Test Statistic			0.302			<b>Lilliefors GOF Test</b>			
2161			5% Lilliefors Critical Value			0.167			Data Not Normal at 5% Significance Level			
2162	<b>Data Not Normal at 5% Significance Level</b>											
2163												
2164	<b>Assuming Normal Distribution</b>											
2165	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
2166			95% Student's-t UCL			1.745			95% Adjusted-CLT UCL (Chen-1995)			1.86
2167									95% Modified-t UCL (Johnson-1978)			1.765
2168												
2169	<b>Gamma GOF Test</b>											
2170			A-D Test Statistic			1.057			<b>Anderson-Darling Gamma GOF Test</b>			
2171			5% A-D Critical Value			0.771			Data Not Gamma Distributed at 5% Significance Level			
2172			K-S Test Statistic			0.186			<b>Kolmogorov-Smirnov Gamma GOF Test</b>			
2173			5% K-S Critical Value			0.173			Data Not Gamma Distributed at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
2174	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
2175												
2176	<b>Gamma Statistics</b>											
2177	k hat (MLE)				1.091		k star (bias corrected MLE)				0.995	
2178	Theta hat (MLE)				1.146		Theta star (bias corrected MLE)				1.258	
2179	nu hat (MLE)				58.93		nu star (bias corrected)				53.71	
2180	MLE Mean (bias corrected)				1.251		MLE Sd (bias corrected)				1.254	
2181							Approximate Chi Square Value (0.05)				37.88	
2182	Adjusted Level of Significance				0.0401		Adjusted Chi Square Value				37.02	
2183												
2184	<b>Assuming Gamma Distribution</b>											
2185	95% Approximate Gamma UCL (use when n>=50))				1.774		95% Adjusted Gamma UCL (use when n<50)				1.815	
2186												
2187	<b>Lognormal GOF Test</b>											
2188	Shapiro Wilk Test Statistic				0.958		<b>Shapiro Wilk Lognormal GOF Test</b>					
2189	5% Shapiro Wilk Critical Value				0.923		Data appear Lognormal at 5% Significance Level					
2190	Lilliefors Test Statistic				0.114		<b>Lilliefors Lognormal GOF Test</b>					
2191	5% Lilliefors Critical Value				0.167		Data appear Lognormal at 5% Significance Level					
2192	<b>Data appear Lognormal at 5% Significance Level</b>											
2193												
2194	<b>Lognormal Statistics</b>											
2195	Minimum of Logged Data				-2.538		Mean of logged Data				-0.3	
2196	Maximum of Logged Data				1.841		SD of logged Data				1.044	
2197												
2198	<b>Assuming Lognormal Distribution</b>											
2199	95% H-UCL				2.165		90% Chebyshev (MVUE) UCL				2.1	
2200	95% Chebyshev (MVUE) UCL				2.49		97.5% Chebyshev (MVUE) UCL				3.031	
2201	99% Chebyshev (MVUE) UCL				4.093							
2202												
2203	<b>Nonparametric Distribution Free UCL Statistics</b>											
2204	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
2205												
2206	<b>Nonparametric Distribution Free UCLs</b>											
2207	95% CLT UCL				1.727		95% Jackknife UCL				1.745	
2208	95% Standard Bootstrap UCL				1.713		95% Bootstrap-t UCL				2.082	
2209	95% Hall's Bootstrap UCL				1.916		95% Percentile Bootstrap UCL				1.768	
2210	95% BCA Bootstrap UCL				1.909							
2211	90% Chebyshev(Mean, Sd) UCL				2.12		95% Chebyshev(Mean, Sd) UCL				2.513	
2212	97.5% Chebyshev(Mean, Sd) UCL				3.059		99% Chebyshev(Mean, Sd) UCL				4.132	
2213												
2214	<b>Suggested UCL to Use</b>											
2215	95% H-UCL				2.165							
2216												
2217	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2218	Recommendations are based upon data size, data distribution, and skewness.											
2219	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2220	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2221												
2222	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
2223	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
2224	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
2225	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
2226												



	A	B	C	D	E	F	G	H	I	J	K	L		
2227														
2228	<b>Phenanthrene</b>													
2229														
2230	<b>General Statistics</b>													
2231	Total Number of Observations					28		Number of Distinct Observations					27	
2232								Number of Missing Observations					0	
2233	Minimum					0.11		Mean					4.97	
2234	Maximum					38		Median					1.6	
2235	SD					9.092		Std. Error of Mean					1.718	
2236	Coefficient of Variation					1.829		Skewness					2.71	
2237														
2238	<b>Normal GOF Test</b>													
2239	Shapiro Wilk Test Statistic					0.555		<b>Shapiro Wilk GOF Test</b>						
2240	5% Shapiro Wilk Critical Value					0.924		Data Not Normal at 5% Significance Level						
2241	Lilliefors Test Statistic					0.338		<b>Lilliefors GOF Test</b>						
2242	5% Lilliefors Critical Value					0.164		Data Not Normal at 5% Significance Level						
2243	<b>Data Not Normal at 5% Significance Level</b>													
2244														
2245	<b>Assuming Normal Distribution</b>													
2246	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>							
2247	95% Student's-t UCL					7.897		95% Adjusted-CLT UCL (Chen-1995)					8.737	
2248								95% Modified-t UCL (Johnson-1978)					8.043	
2249														
2250	<b>Gamma GOF Test</b>													
2251	A-D Test Statistic					1.391		<b>Anderson-Darling Gamma GOF Test</b>						
2252	5% A-D Critical Value					0.804		Data Not Gamma Distributed at 5% Significance Level						
2253	K-S Test Statistic					0.187		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
2254	5% K-S Critical Value					0.174		Data Not Gamma Distributed at 5% Significance Level						
2255	<b>Data Not Gamma Distributed at 5% Significance Level</b>													
2256														
2257	<b>Gamma Statistics</b>													
2258	k hat (MLE)					0.565		k star (bias corrected MLE)					0.528	
2259	Theta hat (MLE)					8.804		Theta star (bias corrected MLE)					9.416	
2260	nu hat (MLE)					31.61		nu star (bias corrected)					29.56	
2261	MLE Mean (bias corrected)					4.97		MLE Sd (bias corrected)					6.841	
2262								Approximate Chi Square Value (0.05)					18.15	
2263	Adjusted Level of Significance					0.0404		Adjusted Chi Square Value					17.59	
2264														
2265	<b>Assuming Gamma Distribution</b>													
2266	95% Approximate Gamma UCL (use when n>=50))					8.096		95% Adjusted Gamma UCL (use when n<50)					8.35	
2267														
2268	<b>Lognormal GOF Test</b>													
2269	Shapiro Wilk Test Statistic					0.974		<b>Shapiro Wilk Lognormal GOF Test</b>						
2270	5% Shapiro Wilk Critical Value					0.924		Data appear Lognormal at 5% Significance Level						
2271	Lilliefors Test Statistic					0.0747		<b>Lilliefors Lognormal GOF Test</b>						
2272	5% Lilliefors Critical Value					0.164		Data appear Lognormal at 5% Significance Level						
2273	<b>Data appear Lognormal at 5% Significance Level</b>													
2274														
2275	<b>Lognormal Statistics</b>													
2276	Minimum of Logged Data					-2.207		Mean of logged Data					0.499	
2277	Maximum of Logged Data					3.638		SD of logged Data					1.485	
2278														
2279	<b>Assuming Lognormal Distribution</b>													

	A	B	C	D	E	F	G	H	I	J	K	L
2280					95% H-UCL	12.06					90% Chebyshev (MVUE) UCL	9.437
2281					95% Chebyshev (MVUE) UCL	11.63					97.5% Chebyshev (MVUE) UCL	14.67
2282					99% Chebyshev (MVUE) UCL	20.64						
2283												
2284	<b>Nonparametric Distribution Free UCL Statistics</b>											
2285	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
2286												
2287	<b>Nonparametric Distribution Free UCLs</b>											
2288					95% CLT UCL	7.796					95% Jackknife UCL	7.897
2289					95% Standard Bootstrap UCL	7.684					95% Bootstrap-t UCL	10.51
2290					95% Hall's Bootstrap UCL	7.919					95% Percentile Bootstrap UCL	7.955
2291					95% BCA Bootstrap UCL	9.034						
2292					90% Chebyshev(Mean, Sd) UCL	10.12					95% Chebyshev(Mean, Sd) UCL	12.46
2293					97.5% Chebyshev(Mean, Sd) UCL	15.7					99% Chebyshev(Mean, Sd) UCL	22.07
2294												
2295	<b>Suggested UCL to Use</b>											
2296					95% H-UCL	12.06						
2297												
2298	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2299	Recommendations are based upon data size, data distribution, and skewness.											
2300	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2301	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2302												
2303	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
2304	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
2305	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
2306	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
2307												

	A	B	C	D	E	F	G	H	I	J	K	L	
1	<b>UCL Statistics for Data Sets with Non-Detects</b>												
2													
3	User Selected Options												
4	Date/Time of Computation		ProUCL 5.12/12/2020 2:35:21 PM										
5	From File		Area D_subsoil_prouclin.xls										
6	Full Precision		OFF										
7	Confidence Coefficient		95%										
8	Number of Bootstrap Operations		2000										
9													
10													
11	<b>Aluminum</b>												
12													
13	<b>General Statistics</b>												
14	Total Number of Observations				88		Number of Distinct Observations				81		
15									Number of Missing Observations				0
16	Minimum				2290		Mean				8838		
17	Maximum				23000		Median				8295		
18	SD				3855		Std. Error of Mean				410.9		
19	Coefficient of Variation				0.436		Skewness				1.332		
20													
21	<b>Normal GOF Test</b>												
22	Shapiro Wilk Test Statistic				0.906		<b>Shapiro Wilk GOF Test</b>						
23	5% Shapiro Wilk P Value				4.5105E-7		Data Not Normal at 5% Significance Level						
24	Lilliefors Test Statistic				0.136		<b>Lilliefors GOF Test</b>						
25	5% Lilliefors Critical Value				0.0946		Data Not Normal at 5% Significance Level						
26	<b>Data Not Normal at 5% Significance Level</b>												
27													
28	<b>Assuming Normal Distribution</b>												
29	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
30	95% Student's-t UCL				9521		95% Adjusted-CLT UCL (Chen-1995)				9576		
31									95% Modified-t UCL (Johnson-1978)				9531
32													
33	<b>Gamma GOF Test</b>												
34	A-D Test Statistic				0.504		<b>Anderson-Darling Gamma GOF Test</b>						
35	5% A-D Critical Value				0.754		Detected data appear Gamma Distributed at 5% Significance Level						
36	K-S Test Statistic				0.0874		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
37	5% K-S Critical Value				0.0955		Detected data appear Gamma Distributed at 5% Significance Level						
38	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
39													
40	<b>Gamma Statistics</b>												
41	k hat (MLE)				5.903		k star (bias corrected MLE)				5.71		
42	Theta hat (MLE)				1497		Theta star (bias corrected MLE)				1548		
43	nu hat (MLE)				1039		nu star (bias corrected)				1005		
44	MLE Mean (bias corrected)				8838		MLE Sd (bias corrected)				3699		
45									Approximate Chi Square Value (0.05)				932.3
46	Adjusted Level of Significance				0.0473		Adjusted Chi Square Value				931.2		
47													
48	<b>Assuming Gamma Distribution</b>												
49	95% Approximate Gamma UCL (use when n>=50)				9526		95% Adjusted Gamma UCL (use when n<50)				9538		
50													
51	<b>Lognormal GOF Test</b>												
52	Shapiro Wilk Test Statistic				0.987		<b>Shapiro Wilk Lognormal GOF Test</b>						
53	5% Shapiro Wilk P Value				0.881		Data appear Lognormal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
54	Lilliefors Test Statistic					0.0826	Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value					0.0946	Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data					7.736	Mean of logged Data					9
60	Maximum of Logged Data					10.04	SD of logged Data					0.422
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL					9608	90% Chebyshev (MVUE) UCL					10086
64	95% Chebyshev (MVUE) UCL					10648	97.5% Chebyshev (MVUE) UCL					11429
65	99% Chebyshev (MVUE) UCL					12961						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL					9514	95% Jackknife UCL					9521
72	95% Standard Bootstrap UCL					9504	95% Bootstrap-t UCL					9570
73	95% Hall's Bootstrap UCL					9567	95% Percentile Bootstrap UCL					9506
74	95% BCA Bootstrap UCL					9571						
75	90% Chebyshev(Mean, Sd) UCL					10071	95% Chebyshev(Mean, Sd) UCL					10629
76	97.5% Chebyshev(Mean, Sd) UCL					11404	99% Chebyshev(Mean, Sd) UCL					12926
77												
78	Suggested UCL to Use											
79	95% Approximate Gamma UCL					9526						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												
86	Antimony											
87												
88	General Statistics											
89	Total Number of Observations					28	Number of Distinct Observations					22
90	Number of Detects					25	Number of Non-Detects					3
91	Number of Distinct Detects					20	Number of Distinct Non-Detects					2
92	Minimum Detect					0.9	Minimum Non-Detect					7.4
93	Maximum Detect					189	Maximum Non-Detect					8.3
94	Variance Detects					1445	Percent Non-Detects					10.71%
95	Mean Detects					11.82	SD Detects					38.01
96	Median Detects					2.2	CV Detects					3.216
97	Skewness Detects					4.607	Kurtosis Detects					21.9
98	Mean of Logged Detects					1.069	SD of Logged Detects					1.196
99												
100	Normal GOF Test on Detects Only											
101	Shapiro Wilk Test Statistic					0.303	Shapiro Wilk GOF Test					
102	5% Shapiro Wilk Critical Value					0.918	Detected Data Not Normal at 5% Significance Level					
103	Lilliefors Test Statistic					0.441	Lilliefors GOF Test					
104	5% Lilliefors Critical Value					0.173	Detected Data Not Normal at 5% Significance Level					
105	Detected Data Not Normal at 5% Significance Level											
106												

	A	B	C	D	E	F	G	H	I	J	K	L	
107	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
108	KM Mean				10.79	KM Standard Error of Mean				6.812			
109	KM SD				35.32	95% KM (BCA) UCL				23.89			
110	95% KM (t) UCL				22.4	95% KM (Percentile Bootstrap) UCL				23.75			
111	95% KM (z) UCL				22	95% KM Bootstrap t UCL				183.1			
112	90% KM Chebyshev UCL				31.23	95% KM Chebyshev UCL				40.49			
113	97.5% KM Chebyshev UCL				53.33	99% KM Chebyshev UCL				78.57			
114													
115	<b>Gamma GOF Tests on Detected Observations Only</b>												
116	A-D Test Statistic				5.019	<b>Anderson-Darling GOF Test</b>							
117	5% A-D Critical Value				0.816	Detected Data Not Gamma Distributed at 5% Significance Level							
118	K-S Test Statistic				0.378	<b>Kolmogorov-Smirnov GOF</b>							
119	5% K-S Critical Value				0.185	Detected Data Not Gamma Distributed at 5% Significance Level							
120	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>												
121													
122	<b>Gamma Statistics on Detected Data Only</b>												
123	k hat (MLE)				0.459	k star (bias corrected MLE)				0.431			
124	Theta hat (MLE)				25.73	Theta star (bias corrected MLE)				27.43			
125	nu hat (MLE)				22.97	nu star (bias corrected)				21.54			
126	Mean (detects)				11.82								
127													
128	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
129	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
130	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
131	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
132	This is especially true when the sample size is small.												
133	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
134	Minimum				0.01	Mean				10.73			
135	Maximum				189	Median				2.05			
136	SD				35.99	CV				3.355			
137	k hat (MLE)				0.391	k star (bias corrected MLE)				0.372			
138	Theta hat (MLE)				27.46	Theta star (bias corrected MLE)				28.79			
139	nu hat (MLE)				21.87	nu star (bias corrected)				20.86			
140	Adjusted Level of Significance ( $\beta$ )				0.0404								
141	Approximate Chi Square Value (20.86, $\alpha$ )				11.49	Adjusted Chi Square Value (20.86, $\beta$ )				11.06			
142	95% Gamma Approximate UCL (use when $n \geq 50$ )				19.48	95% Gamma Adjusted UCL (use when $n < 50$ )				20.23			
143													
144	<b>Estimates of Gamma Parameters using KM Estimates</b>												
145	Mean (KM)				10.79	SD (KM)				35.32			
146	Variance (KM)				1247	SE of Mean (KM)				6.812			
147	k hat (KM)				0.0934	k star (KM)				0.107			
148	nu hat (KM)				5.23	nu star (KM)				6.003			
149	theta hat (KM)				115.6	theta star (KM)				100.7			
150	80% gamma percentile (KM)				8.245	90% gamma percentile (KM)				29.51			
151	95% gamma percentile (KM)				62.33	99% gamma percentile (KM)				165.5			
152													
153	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
154	Approximate Chi Square Value (6.00, $\alpha$ )				1.641	Adjusted Chi Square Value (6.00, $\beta$ )				1.505			
155	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				39.47	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				43.04			
156	95% Gamma Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ )												
157													
158	<b>Lognormal GOF Test on Detected Observations Only</b>												
159	Shapiro Wilk Test Statistic				0.72	<b>Shapiro Wilk GOF Test</b>							

	A	B	C	D	E	F	G	H	I	J	K	L
160	5% Shapiro Wilk Critical Value					0.918	Detected Data Not Lognormal at 5% Significance Level					
161	Lilliefors Test Statistic					0.258	Lilliefors GOF Test					
162	5% Lilliefors Critical Value					0.173	Detected Data Not Lognormal at 5% Significance Level					
163	Detected Data Not Lognormal at 5% Significance Level											
164												
165	Lognormal ROS Statistics Using Imputed Non-Detects											
166	Mean in Original Scale					10.83	Mean in Log Scale					1.048
167	SD in Original Scale					35.95	SD in Log Scale					1.135
168	95% t UCL (assumes normality of ROS data)					22.4	95% Percentile Bootstrap UCL					23.72
169	95% BCA Bootstrap UCL					34	95% Bootstrap t UCL					219.1
170	95% H-UCL (Log ROS)					9.64						
171												
172	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
173	KM Mean (logged)					1.028	KM Geo Mean					2.796
174	KM SD (logged)					1.123	95% Critical H Value (KM-Log)					2.611
175	KM Standard Error of Mean (logged)					0.219	95% H-UCL (KM -Log)					9.237
176	KM SD (logged)					1.123	95% Critical H Value (KM-Log)					2.611
177	KM Standard Error of Mean (logged)					0.219						
178												
179	DL/2 Statistics											
180	DL/2 Normal						DL/2 Log-Transformed					
181	Mean in Original Scale					10.97	Mean in Log Scale					1.098
182	SD in Original Scale					35.92	SD in Log Scale					1.131
183	95% t UCL (Assumes normality)					22.53	95% H-Stat UCL					10.06
184	DL/2 is not a recommended method, provided for comparisons and historical reasons											
185												
186	Nonparametric Distribution Free UCL Statistics											
187	Data do not follow a Discernible Distribution at 5% Significance Level											
188												
189	Suggested UCL to Use											
190	95% KM (Chebyshev) UCL					40.49						
191												
192	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
193	Recommendations are based upon data size, data distribution, and skewness.											
194	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
195	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
196												
197	Arsenic											
198												
199	General Statistics											
200	Total Number of Observations					88	Number of Distinct Observations					61
201	Number of Detects					87	Number of Non-Detects					1
202	Number of Distinct Detects					60	Number of Distinct Non-Detects					1
203	Minimum Detect					2.7	Minimum Non-Detect					12
204	Maximum Detect					19.5	Maximum Non-Detect					12
205	Variance Detects					16.38	Percent Non-Detects					1.136%
206	Mean Detects					7.306	SD Detects					4.047
207	Median Detects					6	CV Detects					0.554
208	Skewness Detects					1.639	Kurtosis Detects					2.143
209	Mean of Logged Detects					1.868	SD of Logged Detects					0.473
210												
211	Normal GOF Test on Detects Only											
212	Shapiro Wilk Test Statistic					0.799	Normal GOF Test on Detected Observations Only					

	A	B	C	D	E	F	G	H	I	J	K	L
213	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
214	Lilliefors Test Statistic					0.198	Lilliefors GOF Test					
215	5% Lilliefors Critical Value					0.0951	Detected Data Not Normal at 5% Significance Level					
216	Detected Data Not Normal at 5% Significance Level											
217												
218	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
219	KM Mean					7.291	KM Standard Error of Mean					0.43
220	KM SD					4.009	95% KM (BCA) UCL					7.948
221	95% KM (t) UCL					8.006	95% KM (Percentile Bootstrap) UCL					8.036
222	95% KM (z) UCL					7.999	95% KM Bootstrap t UCL					8.036
223	90% KM Chebyshev UCL					8.582	95% KM Chebyshev UCL					9.167
224	97.5% KM Chebyshev UCL					9.979	99% KM Chebyshev UCL					11.57
225												
226	Gamma GOF Tests on Detected Observations Only											
227	A-D Test Statistic					2.244	Anderson-Darling GOF Test					
228	5% A-D Critical Value					0.755	Detected Data Not Gamma Distributed at 5% Significance Level					
229	K-S Test Statistic					0.137	Kolmogorov-Smirnov GOF					
230	5% K-S Critical Value					0.0962	Detected Data Not Gamma Distributed at 5% Significance Level					
231	Detected Data Not Gamma Distributed at 5% Significance Level											
232												
233	Gamma Statistics on Detected Data Only											
234	k hat (MLE)					4.316	k star (bias corrected MLE)					4.175
235	Theta hat (MLE)					1.693	Theta star (bias corrected MLE)					1.75
236	nu hat (MLE)					751.1	nu star (bias corrected)					726.5
237	Mean (detects)					7.306						
238												
239	Gamma ROS Statistics using Imputed Non-Detects											
240	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
241	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
242	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
243	This is especially true when the sample size is small.											
244	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
245	Minimum					2.7	Mean					7.292
246	Maximum					19.5	Median					6.05
247	SD					4.025	CV					0.552
248	k hat (MLE)					4.358	k star (bias corrected MLE)					4.217
249	Theta hat (MLE)					1.673	Theta star (bias corrected MLE)					1.729
250	nu hat (MLE)					767	nu star (bias corrected)					742.2
251	Adjusted Level of Significance ( $\beta$ )					0.0473						
252	Approximate Chi Square Value (742.23, $\alpha$ )					680	Adjusted Chi Square Value (742.23, $\beta$ )					679
253	95% Gamma Approximate UCL (use when $n \geq 50$ )					7.959	95% Gamma Adjusted UCL (use when $n < 50$ )					7.971
254												
255	Estimates of Gamma Parameters using KM Estimates											
256	Mean (KM)					7.291	SD (KM)					4.009
257	Variance (KM)					16.07	SE of Mean (KM)					0.43
258	k hat (KM)					3.308	k star (KM)					3.203
259	nu hat (KM)					582.2	nu star (KM)					563.7
260	theta hat (KM)					2.204	theta star (KM)					2.276
261	80% gamma percentile (KM)					10.32	90% gamma percentile (KM)					12.75
262	95% gamma percentile (KM)					15.02	99% gamma percentile (KM)					19.91
263												
264	Gamma Kaplan-Meier (KM) Statistics											
265	Approximate Chi Square Value (563.71, $\alpha$ )					509.6	Adjusted Chi Square Value (563.71, $\beta$ )					508.8

	A	B	C	D	E	F	G	H	I	J	K	L
266	95% Gamma Approximate KM-UCL (use when n>=50)					8.064	95% Gamma Adjusted KM-UCL (use when n<50)					8.078
267												
268	<b>Lognormal GOF Test on Detected Observations Only</b>											
269	Shapiro Wilk Approximate Test Statistic					0.943	<b>Shapiro Wilk GOF Test</b>					
270	5% Shapiro Wilk P Value					0.00154	Detected Data Not Lognormal at 5% Significance Level					
271	Lilliefors Test Statistic					0.101	<b>Lilliefors GOF Test</b>					
272	5% Lilliefors Critical Value					0.0951	Detected Data Not Lognormal at 5% Significance Level					
273	<b>Detected Data Not Lognormal at 5% Significance Level</b>											
274												
275	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
276	Mean in Original Scale					7.291	Mean in Log Scale					1.867
277	SD in Original Scale					4.026	SD in Log Scale					0.47
278	95% t UCL (assumes normality of ROS data)					8.004	95% Percentile Bootstrap UCL					8.01
279	95% BCA Bootstrap UCL					8.07	95% Bootstrap t UCL					8.066
280	95% H-UCL (Log ROS)					7.927						
281												
282	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
283	KM Mean (logged)					1.867	KM Geo Mean					6.468
284	KM SD (logged)					0.469	95% Critical H Value (KM-Log)					1.828
285	KM Standard Error of Mean (logged)					0.0504	95% H-UCL (KM -Log)					7.915
286	KM SD (logged)					0.469	95% Critical H Value (KM-Log)					1.828
287	KM Standard Error of Mean (logged)					0.0504						
288												
289	<b>DL/2 Statistics</b>											
290	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
291	Mean in Original Scale					7.291	Mean in Log Scale					1.868
292	SD in Original Scale					4.026	SD in Log Scale					0.47
293	95% t UCL (Assumes normality)					8.004	95% H-Stat UCL					7.927
294	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
295												
296	<b>Nonparametric Distribution Free UCL Statistics</b>											
297	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
298												
299	<b>Suggested UCL to Use</b>											
300	95% KM (t) UCL					8.006	KM H-UCL					7.915
301	95% KM (BCA) UCL					7.948						
302												
303	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
304	Recommendations are based upon data size, data distribution, and skewness.											
305	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
306	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
307												
308												
309	<b>Barium</b>											
310												
311	<b>General Statistics</b>											
312	Total Number of Observations					88	Number of Distinct Observations					83
313							Number of Missing Observations					0
314	Minimum					16	Mean					132.9
315	Maximum					1530	Median					89.95
316	SD					171.2	Std. Error of Mean					18.25
317	Coefficient of Variation					1.288	Skewness					6.532
318												



	A	B	C	D	E	F	G	H	I	J	K	L
319	<b>Normal GOF Test</b>											
320	Shapiro Wilk Test Statistic					0.46	<b>Shapiro Wilk GOF Test</b>					
321	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					
322	Lilliefors Test Statistic					0.267	<b>Lilliefors GOF Test</b>					
323	5% Lilliefors Critical Value					0.0946	Data Not Normal at 5% Significance Level					
324	<b>Data Not Normal at 5% Significance Level</b>											
325												
326	<b>Assuming Normal Distribution</b>											
327	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
328	95% Student's-t UCL					163.2	95% Adjusted-CLT UCL (Chen-1995)					176.5
329							95% Modified-t UCL (Johnson-1978)					165.3
330												
331	<b>Gamma GOF Test</b>											
332	A-D Test Statistic					3.046	<b>Anderson-Darling Gamma GOF Test</b>					
333	5% A-D Critical Value					0.766	Data Not Gamma Distributed at 5% Significance Level					
334	K-S Test Statistic					0.141	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
335	5% K-S Critical Value					0.0967	Data Not Gamma Distributed at 5% Significance Level					
336	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
337												
338	<b>Gamma Statistics</b>											
339	k hat (MLE)					1.873	k star (bias corrected MLE)					1.817
340	Theta hat (MLE)					70.93	Theta star (bias corrected MLE)					73.13
341	nu hat (MLE)					329.7	nu star (bias corrected)					319.8
342	MLE Mean (bias corrected)					132.9	MLE Sd (bias corrected)					98.58
343							Approximate Chi Square Value (0.05)					279.4
344	Adjusted Level of Significance					0.0473	Adjusted Chi Square Value					278.8
345												
346	<b>Assuming Gamma Distribution</b>											
347	95% Approximate Gamma UCL (use when n>=50))					152.1	95% Adjusted Gamma UCL (use when n<50)					152.5
348												
349	<b>Lognormal GOF Test</b>											
350	Shapiro Wilk Test Statistic					0.97	<b>Shapiro Wilk Lognormal GOF Test</b>					
351	5% Shapiro Wilk P Value					0.177	Data appear Lognormal at 5% Significance Level					
352	Lilliefors Test Statistic					0.0773	<b>Lilliefors Lognormal GOF Test</b>					
353	5% Lilliefors Critical Value					0.0946	Data appear Lognormal at 5% Significance Level					
354	<b>Data appear Lognormal at 5% Significance Level</b>											
355												
356	<b>Lognormal Statistics</b>											
357	Minimum of Logged Data					2.773	Mean of logged Data					4.599
358	Maximum of Logged Data					7.333	SD of logged Data					0.677
359												
360	<b>Assuming Lognormal Distribution</b>											
361	95% H-UCL					144.5	90% Chebyshev (MVUE) UCL					154.3
362	95% Chebyshev (MVUE) UCL					167.7	97.5% Chebyshev (MVUE) UCL					186.4
363	99% Chebyshev (MVUE) UCL					223						
364												
365	<b>Nonparametric Distribution Free UCL Statistics</b>											
366	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
367												
368	<b>Nonparametric Distribution Free UCLs</b>											
369	95% CLT UCL					162.9	95% Jackknife UCL					163.2
370	95% Standard Bootstrap UCL					161.7	95% Bootstrap-t UCL					194.6
371	95% Hall's Bootstrap UCL					287	95% Percentile Bootstrap UCL					166.7

	A	B	C	D	E	F	G	H	I	J	K	L
372	95% BCA Bootstrap UCL					182.5						
373	90% Chebyshev(Mean, Sd) UCL					187.6	95% Chebyshev(Mean, Sd) UCL					212.4
374	97.5% Chebyshev(Mean, Sd) UCL					246.9	99% Chebyshev(Mean, Sd) UCL					314.5
375												
376	<b>Suggested UCL to Use</b>											
377	95% H-UCL					144.5						
378												
379	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
380	Recommendations are based upon data size, data distribution, and skewness.											
381	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
382	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
383												
384	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
385	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
386	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
387	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
388												
389												
390	<b>Cadmium</b>											
391												
392	<b>General Statistics</b>											
393	Total Number of Observations					88	Number of Distinct Observations					74
394							Number of Missing Observations					0
395	Minimum					0.14	Mean					2.314
396	Maximum					26.2	Median					0.675
397	SD					3.968	Std. Error of Mean					0.423
398	Coefficient of Variation					1.715	Skewness					3.429
399												
400	<b>Normal GOF Test</b>											
401	Shapiro Wilk Test Statistic					0.574	<b>Shapiro Wilk GOF Test</b>					
402	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					
403	Lilliefors Test Statistic					0.294	<b>Lilliefors GOF Test</b>					
404	5% Lilliefors Critical Value					0.0946	Data Not Normal at 5% Significance Level					
405	<b>Data Not Normal at 5% Significance Level</b>											
406												
407	<b>Assuming Normal Distribution</b>											
408	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
409	95% Student's-t UCL					3.017	95% Adjusted-CLT UCL (Chen-1995)					3.175
410							95% Modified-t UCL (Johnson-1978)					3.043
411												
412	<b>Gamma GOF Test</b>											
413	A-D Test Statistic					5.99	<b>Anderson-Darling Gamma GOF Test</b>					
414	5% A-D Critical Value					0.798	Data Not Gamma Distributed at 5% Significance Level					
415	K-S Test Statistic					0.223	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
416	5% K-S Critical Value					0.0994	Data Not Gamma Distributed at 5% Significance Level					
417	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
418												
419	<b>Gamma Statistics</b>											
420	k hat (MLE)					0.705	k star (bias corrected MLE)					0.688
421	Theta hat (MLE)					3.284	Theta star (bias corrected MLE)					3.362
422	nu hat (MLE)					124	nu star (bias corrected)					121.1
423	MLE Mean (bias corrected)					2.314	MLE Sd (bias corrected)					2.789
424							Approximate Chi Square Value (0.05)					96.7

	A	B	C	D	E	F	G	H	I	J	K	L
425	Adjusted Level of Significance					0.0473	Adjusted Chi Square Value					96.33
426												
427	<b>Assuming Gamma Distribution</b>											
428	95% Approximate Gamma UCL (use when n>=50))					2.898	95% Adjusted Gamma UCL (use when n<50)					2.908
429												
430	<b>Lognormal GOF Test</b>											
431	Shapiro Wilk Test Statistic					0.915	<b>Shapiro Wilk Lognormal GOF Test</b>					
432	5% Shapiro Wilk P Value					3.6862E-6	Data Not Lognormal at 5% Significance Level					
433	Lilliefors Test Statistic					0.142	<b>Lilliefors Lognormal GOF Test</b>					
434	5% Lilliefors Critical Value					0.0946	Data Not Lognormal at 5% Significance Level					
435	<b>Data Not Lognormal at 5% Significance Level</b>											
436												
437	<b>Lognormal Statistics</b>											
438	Minimum of Logged Data					-1.966	Mean of logged Data					-0.0182
439	Maximum of Logged Data					3.266	SD of logged Data					1.21
440												
441	<b>Assuming Lognormal Distribution</b>											
442	95% H-UCL					2.804	90% Chebyshev (MVUE) UCL					3
443	95% Chebyshev (MVUE) UCL					3.448	97.5% Chebyshev (MVUE) UCL					4.069
444	99% Chebyshev (MVUE) UCL					5.29						
445												
446	<b>Nonparametric Distribution Free UCL Statistics</b>											
447	<b>Data do not follow a Discernible Distribution (0.05)</b>											
448												
449	<b>Nonparametric Distribution Free UCLs</b>											
450	95% CLT UCL					3.009	95% Jackknife UCL					3.017
451	95% Standard Bootstrap UCL					2.992	95% Bootstrap-t UCL					3.23
452	95% Hall's Bootstrap UCL					3.389	95% Percentile Bootstrap UCL					3.066
453	95% BCA Bootstrap UCL					3.241						
454	90% Chebyshev(Mean, Sd) UCL					3.583	95% Chebyshev(Mean, Sd) UCL					4.157
455	97.5% Chebyshev(Mean, Sd) UCL					4.955	99% Chebyshev(Mean, Sd) UCL					6.523
456												
457	<b>Suggested UCL to Use</b>											
458	95% Chebyshev (Mean, Sd) UCL					4.157						
459												
460	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
461	Recommendations are based upon data size, data distribution, and skewness.											
462	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
463	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
464												
465												
466	<b>Chromium</b>											
467												
468	<b>General Statistics</b>											
469	Total Number of Observations					88	Number of Distinct Observations					79
470							Number of Missing Observations					0
471	Minimum					6.2	Mean					32.11
472	Maximum					176	Median					17.15
473	SD					36.16	Std. Error of Mean					3.855
474	Coefficient of Variation					1.126	Skewness					2.323
475												
476	<b>Normal GOF Test</b>											
477	Shapiro Wilk Test Statistic					0.672	<b>Shapiro Wilk GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
478	5% Shapiro Wilk P Value				0	Data Not Normal at 5% Significance Level						
479	Lilliefors Test Statistic				0.264	Lilliefors GOF Test						
480	5% Lilliefors Critical Value				0.0946	Data Not Normal at 5% Significance Level						
481	Data Not Normal at 5% Significance Level											
482												
483	Assuming Normal Distribution											
484	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
485	95% Student's-t UCL				38.51	95% Adjusted-CLT UCL (Chen-1995)					39.47	
486						95% Modified-t UCL (Johnson-1978)					38.67	
487												
488	Gamma GOF Test											
489	A-D Test Statistic				4.96	Anderson-Darling Gamma GOF Test						
490	5% A-D Critical Value				0.775	Data Not Gamma Distributed at 5% Significance Level						
491	K-S Test Statistic				0.2	Kolmogorov-Smirnov Gamma GOF Test						
492	5% K-S Critical Value				0.0974	Data Not Gamma Distributed at 5% Significance Level						
493	Data Not Gamma Distributed at 5% Significance Level											
494												
495	Gamma Statistics											
496	k hat (MLE)				1.342	k star (bias corrected MLE)					1.304	
497	Theta hat (MLE)				23.92	Theta star (bias corrected MLE)					24.62	
498	nu hat (MLE)				236.2	nu star (bias corrected)					229.5	
499	MLE Mean (bias corrected)				32.11	MLE Sd (bias corrected)					28.11	
500						Approximate Chi Square Value (0.05)					195.5	
501	Adjusted Level of Significance				0.0473	Adjusted Chi Square Value					194.9	
502												
503	Assuming Gamma Distribution											
504	95% Approximate Gamma UCL (use when n>=50))				37.7	95% Adjusted Gamma UCL (use when n<50)					37.8	
505												
506	Lognormal GOF Test											
507	Shapiro Wilk Test Statistic				0.898	Shapiro Wilk Lognormal GOF Test						
508	5% Shapiro Wilk P Value				6.8548E-8	Data Not Lognormal at 5% Significance Level						
509	Lilliefors Test Statistic				0.142	Lilliefors Lognormal GOF Test						
510	5% Lilliefors Critical Value				0.0946	Data Not Lognormal at 5% Significance Level						
511	Data Not Lognormal at 5% Significance Level											
512												
513	Lognormal Statistics											
514	Minimum of Logged Data				1.825	Mean of logged Data					3.052	
515	Maximum of Logged Data				5.17	SD of logged Data					0.847	
516												
517	Assuming Lognormal Distribution											
518	95% H-UCL				36.66	90% Chebyshev (MVUE) UCL					39.48	
519	95% Chebyshev (MVUE) UCL				43.72	97.5% Chebyshev (MVUE) UCL					49.6	
520	99% Chebyshev (MVUE) UCL				61.15							
521												
522	Nonparametric Distribution Free UCL Statistics											
523	Data do not follow a Discernible Distribution (0.05)											
524												
525	Nonparametric Distribution Free UCLs											
526	95% CLT UCL				38.45	95% Jackknife UCL					38.51	
527	95% Standard Bootstrap UCL				38.29	95% Bootstrap-t UCL					39.87	
528	95% Hall's Bootstrap UCL				39.72	95% Percentile Bootstrap UCL					38.5	
529	95% BCA Bootstrap UCL				39.76							
530	90% Chebyshev(Mean, Sd) UCL				43.67	95% Chebyshev(Mean, Sd) UCL					48.91	

	A	B	C	D	E	F	G	H	I	J	K	L
531	97.5% Chebyshev(Mean, Sd) UCL					56.18	99% Chebyshev(Mean, Sd) UCL					70.46
532												
533	<b>Suggested UCL to Use</b>											
534	95% Chebyshev (Mean, Sd) UCL					48.91						
535												
536	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
537	Recommendations are based upon data size, data distribution, and skewness.											
538	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
539	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
540												
541												
542	<b>Cobalt</b>											
543												
544	<b>General Statistics</b>											
545	Total Number of Observations				88	Number of Distinct Observations				46		
546						Number of Missing Observations				0		
547	Minimum				1.3	Mean				4.141		
548	Maximum				8.4	Median				3.8		
549	SD				1.571	Std. Error of Mean				0.167		
550	Coefficient of Variation				0.379	Skewness				0.451		
551												
552	<b>Normal GOF Test</b>											
553	Shapiro Wilk Test Statistic				0.96	<b>Shapiro Wilk GOF Test</b>						
554	5% Shapiro Wilk P Value				0.0377	Data Not Normal at 5% Significance Level						
555	Lilliefors Test Statistic				0.0973	<b>Lilliefors GOF Test</b>						
556	5% Lilliefors Critical Value				0.0946	Data Not Normal at 5% Significance Level						
557	<b>Data Not Normal at 5% Significance Level</b>											
558												
559	<b>Assuming Normal Distribution</b>											
560	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>						
561	95% Student's-t UCL				4.419	95% Adjusted-CLT UCL (Chen-1995)				4.425		
562						95% Modified-t UCL (Johnson-1978)				4.421		
563												
564	<b>Gamma GOF Test</b>											
565	A-D Test Statistic				0.445	<b>Anderson-Darling Gamma GOF Test</b>						
566	5% A-D Critical Value				0.754	Detected data appear Gamma Distributed at 5% Significance Level						
567	K-S Test Statistic				0.0929	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
568	5% K-S Critical Value				0.0954	Detected data appear Gamma Distributed at 5% Significance Level						
569	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
570												
571	<b>Gamma Statistics</b>											
572	k hat (MLE)				6.74	k star (bias corrected MLE)				6.518		
573	Theta hat (MLE)				0.614	Theta star (bias corrected MLE)				0.635		
574	nu hat (MLE)				1186	nu star (bias corrected)				1147		
575	MLE Mean (bias corrected)				4.141	MLE Sd (bias corrected)				1.622		
576						Approximate Chi Square Value (0.05)				1069		
577	Adjusted Level of Significance				0.0473	Adjusted Chi Square Value				1068		
578												
579	<b>Assuming Gamma Distribution</b>											
580	95% Approximate Gamma UCL (use when n>=50)					4.441	95% Adjusted Gamma UCL (use when n<50)					4.447
581												
582	<b>Lognormal GOF Test</b>											
583	Shapiro Wilk Test Statistic				0.966	<b>Shapiro Wilk Lognormal GOF Test</b>						

	A	B	C	D	E	F	G	H	I	J	K	L
584	5% Shapiro Wilk P Value					0.101	Data appear Lognormal at 5% Significance Level					
585	Lilliefors Test Statistic					0.103	Lilliefors Lognormal GOF Test					
586	5% Lilliefors Critical Value					0.0946	Data Not Lognormal at 5% Significance Level					
587	Data appear Approximate Lognormal at 5% Significance Level											
588												
589	Lognormal Statistics											
590	Minimum of Logged Data					0.262	Mean of logged Data					1.345
591	Maximum of Logged Data					2.128	SD of logged Data					0.403
592												
593	Assuming Lognormal Distribution											
594	95% H-UCL					4.499	90% Chebyshev (MVUE) UCL					4.715
595	95% Chebyshev (MVUE) UCL					4.967	97.5% Chebyshev (MVUE) UCL					5.316
596	99% Chebyshev (MVUE) UCL					6.003						
597												
598	Nonparametric Distribution Free UCL Statistics											
599	Data appear to follow a Discernible Distribution at 5% Significance Level											
600												
601	Nonparametric Distribution Free UCLs											
602	95% CLT UCL					4.416	95% Jackknife UCL					4.419
603	95% Standard Bootstrap UCL					4.406	95% Bootstrap-t UCL					4.424
604	95% Hall's Bootstrap UCL					4.429	95% Percentile Bootstrap UCL					4.42
605	95% BCA Bootstrap UCL					4.403						
606	90% Chebyshev(Mean, Sd) UCL					4.643	95% Chebyshev(Mean, Sd) UCL					4.871
607	97.5% Chebyshev(Mean, Sd) UCL					5.187	99% Chebyshev(Mean, Sd) UCL					5.807
608												
609	Suggested UCL to Use											
610	95% Approximate Gamma UCL					4.441						
611												
612	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
613	Recommendations are based upon data size, data distribution, and skewness.											
614	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
615	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
616												
617												
618	Copper											
619												
620	General Statistics											
621	Total Number of Observations					88	Number of Distinct Observations					84
622							Number of Missing Observations					0
623	Minimum					6.4	Mean					71.93
624	Maximum					1420	Median					37.4
625	SD					157.3	Std. Error of Mean					16.77
626	Coefficient of Variation					2.187	Skewness					7.548
627												
628	Normal GOF Test											
629	Shapiro Wilk Test Statistic					0.335	Shapiro Wilk GOF Test					
630	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					
631	Lilliefors Test Statistic					0.338	Lilliefors GOF Test					
632	5% Lilliefors Critical Value					0.0946	Data Not Normal at 5% Significance Level					
633	Data Not Normal at 5% Significance Level											
634												
635	Assuming Normal Distribution											
636	95% Normal UCL						95% UCLs (Adjusted for Skewness)					

	A	B	C	D	E	F	G	H	I	J	K	L
637	95% Student's-t UCL				99.81	95% Adjusted-CLT UCL (Chen-1995)					113.9	
638						95% Modified-t UCL (Johnson-1978)					102.1	
639												
640	<b>Gamma GOF Test</b>											
641	A-D Test Statistic				4.532	<b>Anderson-Darling Gamma GOF Test</b>						
642	5% A-D Critical Value				0.781	Data Not Gamma Distributed at 5% Significance Level						
643	K-S Test Statistic				0.151	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
644	5% K-S Critical Value				0.098	Data Not Gamma Distributed at 5% Significance Level						
645	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
646												
647	<b>Gamma Statistics</b>											
648	k hat (MLE)				1.051	k star (bias corrected MLE)					1.023	
649	Theta hat (MLE)				68.44	Theta star (bias corrected MLE)					70.33	
650	nu hat (MLE)				185	nu star (bias corrected)					180	
651	MLE Mean (bias corrected)				71.93	MLE Sd (bias corrected)					71.12	
652						Approximate Chi Square Value (0.05)					150	
653	Adjusted Level of Significance				0.0473	Adjusted Chi Square Value					149.5	
654												
655	<b>Assuming Gamma Distribution</b>											
656	95% Approximate Gamma UCL (use when n>=50))				86.33	95% Adjusted Gamma UCL (use when n<50)					86.59	
657												
658	<b>Lognormal GOF Test</b>											
659	Shapiro Wilk Test Statistic				0.959	<b>Shapiro Wilk Lognormal GOF Test</b>						
660	5% Shapiro Wilk P Value				0.0292	Data Not Lognormal at 5% Significance Level						
661	Lilliefors Test Statistic				0.0664	<b>Lilliefors Lognormal GOF Test</b>						
662	5% Lilliefors Critical Value				0.0946	Data appear Lognormal at 5% Significance Level						
663	<b>Data appear Approximate Lognormal at 5% Significance Level</b>											
664												
665	<b>Lognormal Statistics</b>											
666	Minimum of Logged Data				1.856	Mean of logged Data					3.73	
667	Maximum of Logged Data				7.258	SD of logged Data					0.876	
668												
669	<b>Assuming Lognormal Distribution</b>											
670	95% H-UCL				74.62	90% Chebyshev (MVUE) UCL					80.41	
671	95% Chebyshev (MVUE) UCL				89.31	97.5% Chebyshev (MVUE) UCL					101.7	
672	99% Chebyshev (MVUE) UCL				125.9							
673												
674	<b>Nonparametric Distribution Free UCL Statistics</b>											
675	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
676												
677	<b>Nonparametric Distribution Free UCLs</b>											
678	95% CLT UCL				99.51	95% Jackknife UCL					99.81	
679	95% Standard Bootstrap UCL				99.27	95% Bootstrap-t UCL					150.6	
680	95% Hall's Bootstrap UCL				198.1	95% Percentile Bootstrap UCL					101.9	
681	95% BCA Bootstrap UCL				122.2							
682	90% Chebyshev(Mean, Sd) UCL				122.2	95% Chebyshev(Mean, Sd) UCL					145	
683	97.5% Chebyshev(Mean, Sd) UCL				176.6	99% Chebyshev(Mean, Sd) UCL					238.8	
684												
685	<b>Suggested UCL to Use</b>											
686	95% H-UCL				74.62							
687												
688	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
689	Recommendations are based upon data size, data distribution, and skewness.											

	A	B	C	D	E	F	G	H	I	J	K	L
690	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
691	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
692												
693	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
694	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
695	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
696	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
697												
698												
699	<b>Lead</b>											
700												
701	<b>General Statistics</b>											
702	Total Number of Observations				88		Number of Distinct Observations				85	
703							Number of Missing Observations				0	
704	Minimum				9.5		Mean				258.2	
705	Maximum				3400		Median				139	
706	SD				392		Std. Error of Mean				41.79	
707	Coefficient of Variation				1.518		Skewness				6.119	
708												
709	<b>Normal GOF Test</b>											
710	Shapiro Wilk Test Statistic				0.511		<b>Shapiro Wilk GOF Test</b>					
711	5% Shapiro Wilk P Value				0		Data Not Normal at 5% Significance Level					
712	Lilliefors Test Statistic				0.263		<b>Lilliefors GOF Test</b>					
713	5% Lilliefors Critical Value				0.0946		Data Not Normal at 5% Significance Level					
714	<b>Data Not Normal at 5% Significance Level</b>											
715												
716	<b>Assuming Normal Distribution</b>											
717	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
718	95% Student's-t UCL				327.7		95% Adjusted-CLT UCL (Chen-1995)				356.1	
719							95% Modified-t UCL (Johnson-1978)				332.2	
720												
721	<b>Gamma GOF Test</b>											
722	A-D Test Statistic				1.211		<b>Anderson-Darling Gamma GOF Test</b>					
723	5% A-D Critical Value				0.782		Data Not Gamma Distributed at 5% Significance Level					
724	K-S Test Statistic				0.115		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
725	5% K-S Critical Value				0.0981		Data Not Gamma Distributed at 5% Significance Level					
726	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
727												
728	<b>Gamma Statistics</b>											
729	k hat (MLE)				1.021		k star (bias corrected MLE)				0.994	
730	Theta hat (MLE)				252.8		Theta star (bias corrected MLE)				259.8	
731	nu hat (MLE)				179.7		nu star (bias corrected)				174.9	
732	MLE Mean (bias corrected)				258.2		MLE Sd (bias corrected)				259	
733							Approximate Chi Square Value (0.05)				145.3	
734	Adjusted Level of Significance				0.0473		Adjusted Chi Square Value				144.9	
735												
736	<b>Assuming Gamma Distribution</b>											
737	95% Approximate Gamma UCL (use when n>=50))				310.7		95% Adjusted Gamma UCL (use when n<50)				311.7	
738												
739	<b>Lognormal GOF Test</b>											
740	Shapiro Wilk Test Statistic				0.979		<b>Shapiro Wilk Lognormal GOF Test</b>					
741	5% Shapiro Wilk P Value				0.516		Data appear Lognormal at 5% Significance Level					
742	Lilliefors Test Statistic				0.0688		<b>Lilliefors Lognormal GOF Test</b>					



	A	B	C	D	E	F	G	H	I	J	K	L
743	5% Lilliefors Critical Value					0.0946	Data appear Lognormal at 5% Significance Level					
744	Data appear Lognormal at 5% Significance Level											
745												
746	Lognormal Statistics											
747	Minimum of Logged Data					2.251	Mean of logged Data					4.99
748	Maximum of Logged Data					8.132	SD of logged Data					1.077
749												
750	Assuming Lognormal Distribution											
751	95% H-UCL					342.8	90% Chebyshev (MVUE) UCL					369.1
752	95% Chebyshev (MVUE) UCL					418.6	97.5% Chebyshev (MVUE) UCL					487.4
753	99% Chebyshev (MVUE) UCL					622.4						
754												
755	Nonparametric Distribution Free UCL Statistics											
756	Data appear to follow a Discernible Distribution at 5% Significance Level											
757												
758	Nonparametric Distribution Free UCLs											
759	95% CLT UCL					326.9	95% Jackknife UCL					327.7
760	95% Standard Bootstrap UCL					324.5	95% Bootstrap-t UCL					389
761	95% Hall's Bootstrap UCL					631.6	95% Percentile Bootstrap UCL					330.5
762	95% BCA Bootstrap UCL					369						
763	90% Chebyshev(Mean, Sd) UCL					383.6	95% Chebyshev(Mean, Sd) UCL					440.4
764	97.5% Chebyshev(Mean, Sd) UCL					519.2	99% Chebyshev(Mean, Sd) UCL					674
765												
766	Suggested UCL to Use											
767	95% H-UCL					342.8						
768												
769	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
770	Recommendations are based upon data size, data distribution, and skewness.											
771	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
772	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
773												
774	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
775	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
776	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
777	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
778												
779												
780	Manganese											
781												
782	General Statistics											
783	Total Number of Observations					88	Number of Distinct Observations					81
784							Number of Missing Observations					0
785	Minimum					141	Mean					879.5
786	Maximum					3070	Median					654
787	SD					611	Std. Error of Mean					65.13
788	Coefficient of Variation					0.695	Skewness					1.235
789												
790	Normal GOF Test											
791	Shapiro Wilk Test Statistic					0.856	Shapiro Wilk GOF Test					
792	5% Shapiro Wilk P Value					4.942E-12	Data Not Normal at 5% Significance Level					
793	Lilliefors Test Statistic					0.179	Lilliefors GOF Test					
794	5% Lilliefors Critical Value					0.0946	Data Not Normal at 5% Significance Level					
795	Data Not Normal at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
796												
797	<b>Assuming Normal Distribution</b>											
798	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
799	95% Student's-t UCL				987.8		95% Adjusted-CLT UCL (Chen-1995)				995.8	
800							95% Modified-t UCL (Johnson-1978)				989.2	
801												
802	<b>Gamma GOF Test</b>											
803	A-D Test Statistic				1.731		<b>Anderson-Darling Gamma GOF Test</b>					
804	5% A-D Critical Value				0.762		Data Not Gamma Distributed at 5% Significance Level					
805	K-S Test Statistic				0.127		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
806	5% K-S Critical Value				0.0963		Data Not Gamma Distributed at 5% Significance Level					
807	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
808												
809	<b>Gamma Statistics</b>											
810	k hat (MLE)				2.42		k star (bias corrected MLE)				2.345	
811	Theta hat (MLE)				363.5		Theta star (bias corrected MLE)				375.1	
812	nu hat (MLE)				425.8		nu star (bias corrected)				412.7	
813	MLE Mean (bias corrected)				879.5		MLE Sd (bias corrected)				574.4	
814							Approximate Chi Square Value (0.05)				366.6	
815	Adjusted Level of Significance				0.0473		Adjusted Chi Square Value				365.8	
816												
817	<b>Assuming Gamma Distribution</b>											
818	95% Approximate Gamma UCL (use when n>=50))				990.1		95% Adjusted Gamma UCL (use when n<50)				992	
819												
820	<b>Lognormal GOF Test</b>											
821	Shapiro Wilk Test Statistic				0.96		<b>Shapiro Wilk Lognormal GOF Test</b>					
822	5% Shapiro Wilk P Value				0.0368		Data Not Lognormal at 5% Significance Level					
823	Lilliefors Test Statistic				0.0968		<b>Lilliefors Lognormal GOF Test</b>					
824	5% Lilliefors Critical Value				0.0946		Data Not Lognormal at 5% Significance Level					
825	<b>Data Not Lognormal at 5% Significance Level</b>											
826												
827	<b>Lognormal Statistics</b>											
828	Minimum of Logged Data				4.949		Mean of logged Data				6.559	
829	Maximum of Logged Data				8.029		SD of logged Data				0.667	
830												
831	<b>Assuming Lognormal Distribution</b>											
832	95% H-UCL				1015		90% Chebyshev (MVUE) UCL				1084	
833	95% Chebyshev (MVUE) UCL				1177		97.5% Chebyshev (MVUE) UCL				1306	
834	99% Chebyshev (MVUE) UCL				1559							
835												
836	<b>Nonparametric Distribution Free UCL Statistics</b>											
837	<b>Data do not follow a Discernible Distribution (0.05)</b>											
838												
839	<b>Nonparametric Distribution Free UCLs</b>											
840	95% CLT UCL				986.6		95% Jackknife UCL				987.8	
841	95% Standard Bootstrap UCL				982.1		95% Bootstrap-t UCL				998.8	
842	95% Hall's Bootstrap UCL				998.6		95% Percentile Bootstrap UCL				983.9	
843	95% BCA Bootstrap UCL				990.6							
844	90% Chebyshev(Mean, Sd) UCL				1075		95% Chebyshev(Mean, Sd) UCL				1163	
845	97.5% Chebyshev(Mean, Sd) UCL				1286		99% Chebyshev(Mean, Sd) UCL				1528	
846												
847	<b>Suggested UCL to Use</b>											
848	95% Chebyshev (Mean, Sd) UCL				1163							

	A	B	C	D	E	F	G	H	I	J	K	L
849												
850	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
851	Recommendations are based upon data size, data distribution, and skewness.											
852	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
853	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
854												
855												
856	<b>Mercury</b>											
857												
858	<b>General Statistics</b>											
859	Total Number of Observations				82		Number of Distinct Observations				75	
860					Number of Missing Observations				0			
861	Minimum				0.011		Mean				0.279	
862	Maximum				3.1		Median				0.186	
863	SD				0.38		Std. Error of Mean				0.0419	
864	Coefficient of Variation				1.361		Skewness				5.406	
865												
866	<b>Normal GOF Test</b>											
867	Shapiro Wilk Test Statistic				0.542		<b>Shapiro Wilk GOF Test</b>					
868	5% Shapiro Wilk P Value				0		Data Not Normal at 5% Significance Level					
869	Lilliefors Test Statistic				0.262		<b>Lilliefors GOF Test</b>					
870	5% Lilliefors Critical Value				0.098		Data Not Normal at 5% Significance Level					
871	<b>Data Not Normal at 5% Significance Level</b>											
872												
873	<b>Assuming Normal Distribution</b>											
874	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
875	95% Student's-t UCL				0.349		95% Adjusted-CLT UCL (Chen-1995)				0.375	
876					95% Modified-t UCL (Johnson-1978)				0.353			
877												
878	<b>Gamma GOF Test</b>											
879	A-D Test Statistic				1.328		<b>Anderson-Darling Gamma GOF Test</b>					
880	5% A-D Critical Value				0.777		Data Not Gamma Distributed at 5% Significance Level					
881	K-S Test Statistic				0.132		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
882	5% K-S Critical Value				0.101		Data Not Gamma Distributed at 5% Significance Level					
883	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
884												
885	<b>Gamma Statistics</b>											
886	k hat (MLE)				1.232		k star (bias corrected MLE)				1.195	
887	Theta hat (MLE)				0.226		Theta star (bias corrected MLE)				0.233	
888	nu hat (MLE)				202.1		nu star (bias corrected)				196	
889	MLE Mean (bias corrected)				0.279		MLE Sd (bias corrected)				0.255	
890					Approximate Chi Square Value (0.05)				164.6			
891	Adjusted Level of Significance				0.0471		Adjusted Chi Square Value				164.1	
892												
893	<b>Assuming Gamma Distribution</b>											
894	95% Approximate Gamma UCL (use when n>=50))				0.332		95% Adjusted Gamma UCL (use when n<50)				0.333	
895												
896	<b>Lognormal GOF Test</b>											
897	Shapiro Wilk Test Statistic				0.979		<b>Shapiro Wilk Lognormal GOF Test</b>					
898	5% Shapiro Wilk P Value				0.549		Data appear Lognormal at 5% Significance Level					
899	Lilliefors Test Statistic				0.0786		<b>Lilliefors Lognormal GOF Test</b>					
900	5% Lilliefors Critical Value				0.098		Data appear Lognormal at 5% Significance Level					
901	<b>Data appear Lognormal at 5% Significance Level</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
902												
903	<b>Lognormal Statistics</b>											
904	Minimum of Logged Data				-4.51		Mean of logged Data				-1.735	
905	Maximum of Logged Data				1.131		SD of logged Data				0.968	
906												
907	<b>Assuming Lognormal Distribution</b>											
908	95% H-UCL				0.357		90% Chebyshev (MVUE) UCL				0.386	
909	95% Chebyshev (MVUE) UCL				0.434		97.5% Chebyshev (MVUE) UCL				0.5	
910	99% Chebyshev (MVUE) UCL				0.632							
911												
912	<b>Nonparametric Distribution Free UCL Statistics</b>											
913	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
914												
915	<b>Nonparametric Distribution Free UCLs</b>											
916	95% CLT UCL				0.348		95% Jackknife UCL				0.349	
917	95% Standard Bootstrap UCL				0.346		95% Bootstrap-t UCL				0.397	
918	95% Hall's Bootstrap UCL				0.653		95% Percentile Bootstrap UCL				0.355	
919	95% BCA Bootstrap UCL				0.374							
920	90% Chebyshev(Mean, Sd) UCL				0.405		95% Chebyshev(Mean, Sd) UCL				0.462	
921	97.5% Chebyshev(Mean, Sd) UCL				0.541		99% Chebyshev(Mean, Sd) UCL				0.696	
922												
923	<b>Suggested UCL to Use</b>											
924	95% H-UCL				0.357							
925												
926	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
927	Recommendations are based upon data size, data distribution, and skewness.											
928	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
929	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
930												
931	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
932	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
933	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
934	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
935												
936	<b>Silver</b>											
937												
938	<b>General Statistics</b>											
939	Total Number of Observations				59		Number of Distinct Observations				26	
940	Number of Detects				54		Number of Non-Detects				5	
941	Number of Distinct Detects				26		Number of Distinct Non-Detects				3	
942	Minimum Detect				0.07		Minimum Non-Detect				1.2	
943	Maximum Detect				10.7		Maximum Non-Detect				1.4	
944	Variance Detects				2.443		Percent Non-Detects				8.475%	
945	Mean Detects				0.906		SD Detects				1.563	
946	Median Detects				0.4		CV Detects				1.725	
947	Skewness Detects				4.88		Kurtosis Detects				29.58	
948	Mean of Logged Detects				-0.919		SD of Logged Detects				1.278	
949												
950	<b>Normal GOF Test on Detects Only</b>											
951	Shapiro Wilk Test Statistic				0.522		<b>Normal GOF Test on Detected Observations Only</b>					
952	5% Shapiro Wilk P Value				0		Detected Data Not Normal at 5% Significance Level					
953	Lilliefors Test Statistic				0.296		<b>Lilliefors GOF Test</b>					
954	5% Lilliefors Critical Value				0.12		Detected Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L	
955	<b>Detected Data Not Normal at 5% Significance Level</b>												
956													
957	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
958	KM Mean				0.856	KM Standard Error of Mean				0.197			
959	KM SD				1.493	95% KM (BCA) UCL				1.242			
960	95% KM (t) UCL				1.185	95% KM (Percentile Bootstrap) UCL				1.219			
961	95% KM (z) UCL				1.18	95% KM Bootstrap t UCL				1.469			
962	90% KM Chebyshev UCL				1.446	95% KM Chebyshev UCL				1.713			
963	97.5% KM Chebyshev UCL				2.084	99% KM Chebyshev UCL				2.812			
964													
965	<b>Gamma GOF Tests on Detected Observations Only</b>												
966	A-D Test Statistic				2.106	<b>Anderson-Darling GOF Test</b>							
967	5% A-D Critical Value				0.794	Detected Data Not Gamma Distributed at 5% Significance Level							
968	K-S Test Statistic				0.175	<b>Kolmogorov-Smirnov GOF</b>							
969	5% K-S Critical Value				0.126	Detected Data Not Gamma Distributed at 5% Significance Level							
970	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>												
971													
972	<b>Gamma Statistics on Detected Data Only</b>												
973	k hat (MLE)				0.732	k star (bias corrected MLE)				0.704			
974	Theta hat (MLE)				1.238	Theta star (bias corrected MLE)				1.288			
975	nu hat (MLE)				79.05	nu star (bias corrected)				75.99			
976	Mean (detects)				0.906								
977													
978	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
979	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
980	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
981	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
982	This is especially true when the sample size is small.												
983	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
984	Minimum				0.01	Mean				0.845			
985	Maximum				10.7	Median				0.356			
986	SD				1.508	CV				1.785			
987	k hat (MLE)				0.679	k star (bias corrected MLE)				0.656			
988	Theta hat (MLE)				1.245	Theta star (bias corrected MLE)				1.289			
989	nu hat (MLE)				80.1	nu star (bias corrected)				77.36			
990	Adjusted Level of Significance ( $\beta$ )				0.0459								
991	Approximate Chi Square Value (77.36, $\alpha$ )				58.1	Adjusted Chi Square Value (77.36, $\beta$ )				57.68			
992	95% Gamma Approximate UCL (use when $n \geq 50$ )				1.125	95% Gamma Adjusted UCL (use when $n < 50$ )				1.133			
993													
994	<b>Estimates of Gamma Parameters using KM Estimates</b>												
995	Mean (KM)				0.856	SD (KM)				1.493			
996	Variance (KM)				2.229	SE of Mean (KM)				0.197			
997	k hat (KM)				0.329	k star (KM)				0.324			
998	nu hat (KM)				38.82	nu star (KM)				38.17			
999	theta hat (KM)				2.603	theta star (KM)				2.647			
1000	80% gamma percentile (KM)				1.336	90% gamma percentile (KM)				2.501			
1001	95% gamma percentile (KM)				3.822	99% gamma percentile (KM)				7.224			
1002													
1003	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1004	Approximate Chi Square Value (38.17, $\alpha$ )				25.03	Adjusted Chi Square Value (38.17, $\beta$ )				24.76			
1005	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				1.306	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				1.32			
1006													
1007	<b>Lognormal GOF Test on Detected Observations Only</b>												

	A	B	C	D	E	F	G	H	I	J	K	L
1008	Shapiro Wilk Approximate Test Statistic					0.904	Shapiro Wilk GOF Test					
1009	5% Shapiro Wilk P Value					1.9509E-4	Detected Data Not Lognormal at 5% Significance Level					
1010	Lilliefors Test Statistic					0.175	Lilliefors GOF Test					
1011	5% Lilliefors Critical Value					0.12	Detected Data Not Lognormal at 5% Significance Level					
1012	Detected Data Not Lognormal at 5% Significance Level											
1013												
1014	Lognormal ROS Statistics Using Imputed Non-Detects											
1015	Mean in Original Scale					0.852	Mean in Log Scale					-0.96
1016	SD in Original Scale					1.505	SD in Log Scale					1.234
1017	95% t UCL (assumes normality of ROS data)					1.179	95% Percentile Bootstrap UCL					1.227
1018	95% BCA Bootstrap UCL					1.381	95% Bootstrap t UCL					1.48
1019	95% H-UCL (Log ROS)					1.288						
1020												
1021	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1022	KM Mean (logged)					-0.971	KM Geo Mean					0.379
1023	KM SD (logged)					1.248	95% Critical H Value (KM-Log)					2.82
1024	KM Standard Error of Mean (logged)					0.168	95% H-UCL (KM -Log)					1.311
1025	KM SD (logged)					1.248	95% Critical H Value (KM-Log)					2.82
1026	KM Standard Error of Mean (logged)					0.168						
1027												
1028	DL/2 Statistics											
1029	DL/2 Normal					DL/2 Log-Transformed						
1030	Mean in Original Scale					0.883	Mean in Log Scale					-0.879
1031	SD in Original Scale					1.496	SD in Log Scale					1.229
1032	95% t UCL (Assumes normality)					1.209	95% H-Stat UCL					1.382
1033	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1034												
1035	Nonparametric Distribution Free UCL Statistics											
1036	Data do not follow a Discernible Distribution at 5% Significance Level											
1037												
1038	Suggested UCL to Use											
1039	95% KM (Chebyshev) UCL					1.713						
1040												
1041	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1042	Recommendations are based upon data size, data distribution, and skewness.											
1043	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1044	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1045												
1046	Thallium											
1047												
1048	General Statistics											
1049	Total Number of Observations					33	Number of Distinct Observations					24
1050	Number of Detects					32	Number of Non-Detects					1
1051	Number of Distinct Detects					24	Number of Distinct Non-Detects					1
1052	Minimum Detect					0.7	Minimum Non-Detect					1.3
1053	Maximum Detect					4.4	Maximum Non-Detect					1.3
1054	Variance Detects					1.106	Percent Non-Detects					3.03%
1055	Mean Detects					2.074	SD Detects					1.052
1056	Median Detects					1.9	CV Detects					0.507
1057	Skewness Detects					0.747	Kurtosis Detects					-0.227
1058	Mean of Logged Detects					0.601	SD of Logged Detects					0.528
1059												
1060	Normal GOF Test on Detects Only											

	A	B	C	D	E	F	G	H	I	J	K	L
1061	Shapiro Wilk Test Statistic					0.922	Shapiro Wilk GOF Test					
1062	5% Shapiro Wilk Critical Value					0.93	Detected Data Not Normal at 5% Significance Level					
1063	Lilliefors Test Statistic					0.111	Lilliefors GOF Test					
1064	5% Lilliefors Critical Value					0.154	Detected Data appear Normal at 5% Significance Level					
1065	Detected Data appear Approximate Normal at 5% Significance Level											
1066												
1067	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1068	KM Mean					2.037	KM Standard Error of Mean					0.184
1069	KM SD					1.04	95% KM (BCA) UCL					2.364
1070	95% KM (t) UCL					2.349	95% KM (Percentile Bootstrap) UCL					2.328
1071	95% KM (z) UCL					2.34	95% KM Bootstrap t UCL					2.4
1072	90% KM Chebyshev UCL					2.59	95% KM Chebyshev UCL					2.84
1073	97.5% KM Chebyshev UCL					3.187	99% KM Chebyshev UCL					3.869
1074												
1075	Gamma GOF Tests on Detected Observations Only											
1076	A-D Test Statistic					0.245	Anderson-Darling GOF Test					
1077	5% A-D Critical Value					0.751	Detected data appear Gamma Distributed at 5% Significance Level					
1078	K-S Test Statistic					0.0682	Kolmogorov-Smirnov GOF					
1079	5% K-S Critical Value					0.156	Detected data appear Gamma Distributed at 5% Significance Level					
1080	Detected data appear Gamma Distributed at 5% Significance Level											
1081												
1082	Gamma Statistics on Detected Data Only											
1083	k hat (MLE)					4.044	k star (bias corrected MLE)					3.686
1084	Theta hat (MLE)					0.513	Theta star (bias corrected MLE)					0.563
1085	nu hat (MLE)					258.8	nu star (bias corrected)					235.9
1086	Mean (detects)					2.074						
1087												
1088	Gamma ROS Statistics using Imputed Non-Detects											
1089	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1090	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1091	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1092	This is especially true when the sample size is small.											
1093	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1094	Minimum					0.7	Mean					2.037
1095	Maximum					4.4	Median					1.9
1096	SD					1.057	CV					0.519
1097	k hat (MLE)					3.896	k star (bias corrected MLE)					3.562
1098	Theta hat (MLE)					0.523	Theta star (bias corrected MLE)					0.572
1099	nu hat (MLE)					257.1	nu star (bias corrected)					235.1
1100	Adjusted Level of Significance ( $\beta$ )					0.0419						
1101	Approximate Chi Square Value (235.10, $\alpha$ )					200.6	Adjusted Chi Square Value (235.10, $\beta$ )					199
1102	95% Gamma Approximate UCL (use when $n \geq 50$ )					2.387	95% Gamma Adjusted UCL (use when $n < 50$ )					2.407
1103												
1104	Estimates of Gamma Parameters using KM Estimates											
1105	Mean (KM)					2.037	SD (KM)					1.04
1106	Variance (KM)					1.082	SE of Mean (KM)					0.184
1107	k hat (KM)					3.837	k star (KM)					3.508
1108	nu hat (KM)					253.2	nu star (KM)					231.5
1109	theta hat (KM)					0.531	theta star (KM)					0.581
1110	80% gamma percentile (KM)					2.853	90% gamma percentile (KM)					3.496
1111	95% gamma percentile (KM)					4.092	99% gamma percentile (KM)					5.373
1112												
1113	Gamma Kaplan-Meier (KM) Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
1114	Approximate Chi Square Value (231.53, $\alpha$ )					197.3	Adjusted Chi Square Value (231.53, $\beta$ )					195.7
1115	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					2.391	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					2.411
1116												
1117	<b>Lognormal GOF Test on Detected Observations Only</b>											
1118	Shapiro Wilk Test Statistic					0.96	<b>Shapiro Wilk GOF Test</b>					
1119	5% Shapiro Wilk Critical Value					0.93	Detected Data appear Lognormal at 5% Significance Level					
1120	Lilliefors Test Statistic					0.0659	<b>Lilliefors GOF Test</b>					
1121	5% Lilliefors Critical Value					0.154	Detected Data appear Lognormal at 5% Significance Level					
1122	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1123												
1124	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1125	Mean in Original Scale					2.039	Mean in Log Scale					0.58
1126	SD in Original Scale					1.054	SD in Log Scale					0.533
1127	95% t UCL (assumes normality of ROS data)					2.35	95% Percentile Bootstrap UCL					2.339
1128	95% BCA Bootstrap UCL					2.381	95% Bootstrap t UCL					2.37
1129	95% H-UCL (Log ROS)					2.476						
1130												
1131	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1132	KM Mean (logged)					0.578	KM Geo Mean					1.782
1133	KM SD (logged)					0.528	95% Critical H Value (KM-Log)					1.958
1134	KM Standard Error of Mean (logged)					0.0936	95% H-UCL (KM -Log)					2.46
1135	KM SD (logged)					0.528	95% Critical H Value (KM-Log)					1.958
1136	KM Standard Error of Mean (logged)					0.0936						
1137												
1138	<b>DL/2 Statistics</b>											
1139	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1140	Mean in Original Scale					2.031	Mean in Log Scale					0.569
1141	SD in Original Scale					1.064	SD in Log Scale					0.549
1142	95% t UCL (Assumes normality)					2.344	95% H-Stat UCL					2.49
1143	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1144												
1145	<b>Nonparametric Distribution Free UCL Statistics</b>											
1146	<b>Detected Data appear Approximate Normal Distributed at 5% Significance Level</b>											
1147												
1148	<b>Suggested UCL to Use</b>											
1149	95% KM (t) UCL					2.349						
1150												
1151	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1152	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1153												
1154	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1155	Recommendations are based upon data size, data distribution, and skewness.											
1156	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1157	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1158												
1159												
1160	<b>Vanadium</b>											
1161												
1162	<b>General Statistics</b>											
1163	Total Number of Observations					88	Number of Distinct Observations					70
1164							Number of Missing Observations					0
1165	Minimum					8.5	Mean					18.36
1166	Maximum					69.7	Median					16.45



	A	B	C	D	E	F	G	H	I	J	K	L
1167					SD	9.558				Std. Error of Mean		1.019
1168					Coefficient of Variation	0.52				Skewness		3.61
1169												
1170	<b>Normal GOF Test</b>											
1171					Shapiro Wilk Test Statistic	0.645				<b>Shapiro Wilk GOF Test</b>		
1172					5% Shapiro Wilk P Value	0				Data Not Normal at 5% Significance Level		
1173					Lilliefors Test Statistic	0.205				<b>Lilliefors GOF Test</b>		
1174					5% Lilliefors Critical Value	0.0946				Data Not Normal at 5% Significance Level		
1175	<b>Data Not Normal at 5% Significance Level</b>											
1176												
1177	<b>Assuming Normal Distribution</b>											
1178					<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>		
1179					95% Student's-t UCL	20.06				95% Adjusted-CLT UCL (Chen-1995)		20.46
1180										95% Modified-t UCL (Johnson-1978)		20.12
1181												
1182	<b>Gamma GOF Test</b>											
1183					A-D Test Statistic	3.114				<b>Anderson-Darling Gamma GOF Test</b>		
1184					5% A-D Critical Value	0.754				Data Not Gamma Distributed at 5% Significance Level		
1185					K-S Test Statistic	0.126				<b>Kolmogorov-Smirnov Gamma GOF Test</b>		
1186					5% K-S Critical Value	0.0955				Data Not Gamma Distributed at 5% Significance Level		
1187	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
1188												
1189	<b>Gamma Statistics</b>											
1190					k hat (MLE)	6.423				k star (bias corrected MLE)		6.211
1191					Theta hat (MLE)	2.859				Theta star (bias corrected MLE)		2.956
1192					nu hat (MLE)	1130				nu star (bias corrected)		1093
1193					MLE Mean (bias corrected)	18.36				MLE Sd (bias corrected)		7.368
1194										Approximate Chi Square Value (0.05)		1017
1195					Adjusted Level of Significance	0.0473				Adjusted Chi Square Value		1016
1196												
1197	<b>Assuming Gamma Distribution</b>											
1198					95% Approximate Gamma UCL (use when n>=50))	19.73				95% Adjusted Gamma UCL (use when n<50)		19.75
1199												
1200	<b>Lognormal GOF Test</b>											
1201					Shapiro Wilk Test Statistic	0.907				<b>Shapiro Wilk Lognormal GOF Test</b>		
1202					5% Shapiro Wilk P Value	6.0874E-7				Data Not Lognormal at 5% Significance Level		
1203					Lilliefors Test Statistic	0.095				<b>Lilliefors Lognormal GOF Test</b>		
1204					5% Lilliefors Critical Value	0.0946				Data Not Lognormal at 5% Significance Level		
1205	<b>Data Not Lognormal at 5% Significance Level</b>											
1206												
1207	<b>Lognormal Statistics</b>											
1208					Minimum of Logged Data	2.14				Mean of logged Data		2.831
1209					Maximum of Logged Data	4.244				SD of logged Data		0.366
1210												
1211	<b>Assuming Lognormal Distribution</b>											
1212					95% H-UCL	19.43				90% Chebyshev (MVUE) UCL		20.29
1213					95% Chebyshev (MVUE) UCL	21.28				97.5% Chebyshev (MVUE) UCL		22.65
1214					99% Chebyshev (MVUE) UCL	25.34						
1215												
1216	<b>Nonparametric Distribution Free UCL Statistics</b>											
1217	<b>Data do not follow a Discernible Distribution (0.05)</b>											
1218												
1219	<b>Nonparametric Distribution Free UCLs</b>											



	A	B	C	D	E	F	G	H	I	J	K	L
1273	<b>Assuming Gamma Distribution</b>											
1274	95% Approximate Gamma UCL (use when n>=50))					487.7	95% Adjusted Gamma UCL (use when n<50)					489.3
1275												
1276	<b>Lognormal GOF Test</b>											
1277	Shapiro Wilk Test Statistic					0.897	<b>Shapiro Wilk Lognormal GOF Test</b>					
1278	5% Shapiro Wilk P Value					6.0510E-8	Data Not Lognormal at 5% Significance Level					
1279	Lilliefors Test Statistic					0.15	<b>Lilliefors Lognormal GOF Test</b>					
1280	5% Lilliefors Critical Value					0.0946	Data Not Lognormal at 5% Significance Level					
1281	<b>Data Not Lognormal at 5% Significance Level</b>											
1282												
1283	<b>Lognormal Statistics</b>											
1284	Minimum of Logged Data					3.718	Mean of logged Data					5.382
1285	Maximum of Logged Data					7.745	SD of logged Data					1.049
1286												
1287	<b>Assuming Lognormal Distribution</b>											
1288	95% H-UCL					487.4	90% Chebyshev (MVUE) UCL					525.1
1289	95% Chebyshev (MVUE) UCL					593.8	97.5% Chebyshev (MVUE) UCL					689.2
1290	99% Chebyshev (MVUE) UCL					876.7						
1291												
1292	<b>Nonparametric Distribution Free UCL Statistics</b>											
1293	<b>Data do not follow a Discernible Distribution (0.05)</b>											
1294												
1295	<b>Nonparametric Distribution Free UCLs</b>											
1296	95% CLT UCL					493.3	95% Jackknife UCL					494.3
1297	95% Standard Bootstrap UCL					493.6	95% Bootstrap-t UCL					509.9
1298	95% Hall's Bootstrap UCL					511.9	95% Percentile Bootstrap UCL					491.6
1299	95% BCA Bootstrap UCL					499.7						
1300	90% Chebyshev(Mean, Sd) UCL					568.3	95% Chebyshev(Mean, Sd) UCL					643.6
1301	97.5% Chebyshev(Mean, Sd) UCL					748.1	99% Chebyshev(Mean, Sd) UCL					953.3
1302												
1303	<b>Suggested UCL to Use</b>											
1304	95% Chebyshev (Mean, Sd) UCL					643.6						
1305												
1306	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1307	Recommendations are based upon data size, data distribution, and skewness.											
1308	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1309	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1310												
1311	<b>Aroclor 1248</b>											
1312												
1313	<b>General Statistics</b>											
1314	Total Number of Observations					26	Number of Distinct Observations					26
1315	Number of Detects					20	Number of Non-Detects					6
1316	Number of Distinct Detects					20	Number of Distinct Non-Detects					6
1317	Minimum Detect					4.6000E-5	Minimum Non-Detect					0.032
1318	Maximum Detect					2.2	Maximum Non-Detect					0.19
1319	Variance Detects					0.385	Percent Non-Detects					23.08%
1320	Mean Detects					0.56	SD Detects					0.621
1321	Median Detects					0.285	CV Detects					1.108
1322	Skewness Detects					1.254	Kurtosis Detects					0.887
1323	Mean of Logged Detects					-1.611	SD of Logged Detects					2.314
1324												
1325	<b>Normal GOF Test on Detects Only</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1326	Shapiro Wilk Test Statistic					0.815	Shapiro Wilk GOF Test					
1327	5% Shapiro Wilk Critical Value					0.905	Detected Data Not Normal at 5% Significance Level					
1328	Lilliefors Test Statistic					0.282	Lilliefors GOF Test					
1329	5% Lilliefors Critical Value					0.192	Detected Data Not Normal at 5% Significance Level					
1330	Detected Data Not Normal at 5% Significance Level											
1331												
1332	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1333	KM Mean					0.434	KM Standard Error of Mean					0.116
1334	KM SD					0.579	95% KM (BCA) UCL					0.645
1335	95% KM (t) UCL					0.633	95% KM (Percentile Bootstrap) UCL					0.631
1336	95% KM (z) UCL					0.625	95% KM Bootstrap t UCL					0.691
1337	90% KM Chebyshev UCL					0.783	95% KM Chebyshev UCL					0.941
1338	97.5% KM Chebyshev UCL					1.161	99% KM Chebyshev UCL					1.592
1339												
1340	Gamma GOF Tests on Detected Observations Only											
1341	A-D Test Statistic					0.496	Anderson-Darling GOF Test					
1342	5% A-D Critical Value					0.793	Detected data appear Gamma Distributed at 5% Significance Level					
1343	K-S Test Statistic					0.142	Kolmogorov-Smirnov GOF					
1344	5% K-S Critical Value					0.203	Detected data appear Gamma Distributed at 5% Significance Level					
1345	Detected data appear Gamma Distributed at 5% Significance Level											
1346												
1347	Gamma Statistics on Detected Data Only											
1348	k hat (MLE)					0.6	k star (bias corrected MLE)					0.543
1349	Theta hat (MLE)					0.934	Theta star (bias corrected MLE)					1.031
1350	nu hat (MLE)					23.98	nu star (bias corrected)					21.72
1351	Mean (detects)					0.56						
1352												
1353	Gamma ROS Statistics using Imputed Non-Detects											
1354	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1355	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1356	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1357	This is especially true when the sample size is small.											
1358	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1359	Minimum					4.6000E-5	Mean					0.433
1360	Maximum					2.2	Median					0.125
1361	SD					0.59	CV					1.363
1362	k hat (MLE)					0.442	k star (bias corrected MLE)					0.417
1363	Theta hat (MLE)					0.979	Theta star (bias corrected MLE)					1.039
1364	nu hat (MLE)					22.99	nu star (bias corrected)					21.67
1365	Adjusted Level of Significance ( $\beta$ )					0.0398						
1366	Approximate Chi Square Value (21.67, $\alpha$ )					12.09	Adjusted Chi Square Value (21.67, $\beta$ )					11.62
1367	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.776	95% Gamma Adjusted UCL (use when $n < 50$ )					0.808
1368												
1369	Estimates of Gamma Parameters using KM Estimates											
1370	Mean (KM)					0.434	SD (KM)					0.579
1371	Variance (KM)					0.335	SE of Mean (KM)					0.116
1372	k hat (KM)					0.562	k star (KM)					0.522
1373	nu hat (KM)					29.2	nu star (KM)					27.17
1374	theta hat (KM)					0.772	theta star (KM)					0.83
1375	80% gamma percentile (KM)					0.713	90% gamma percentile (KM)					1.162
1376	95% gamma percentile (KM)					1.64	99% gamma percentile (KM)					2.809
1377												
1378	Gamma Kaplan-Meier (KM) Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
1379	Approximate Chi Square Value (27.17, $\alpha$ )					16.28	Adjusted Chi Square Value (27.17, $\beta$ )					15.72
1380	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.724	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.749
1381												
1382	<b>Lognormal GOF Test on Detected Observations Only</b>											
1383	Shapiro Wilk Test Statistic					0.734	<b>Shapiro Wilk GOF Test</b>					
1384	5% Shapiro Wilk Critical Value					0.905	Detected Data Not Lognormal at 5% Significance Level					
1385	Lilliefors Test Statistic					0.228	<b>Lilliefors GOF Test</b>					
1386	5% Lilliefors Critical Value					0.192	Detected Data Not Lognormal at 5% Significance Level					
1387	<b>Detected Data Not Lognormal at 5% Significance Level</b>											
1388												
1389	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1390	Mean in Original Scale					0.432	Mean in Log Scale					-2.43
1391	SD in Original Scale					0.591	SD in Log Scale					2.546
1392	95% t UCL (assumes normality of ROS data)					0.63	95% Percentile Bootstrap UCL					0.63
1393	95% BCA Bootstrap UCL					0.653	95% Bootstrap t UCL					0.692
1394	95% H-UCL (Log ROS)					27.61						
1395												
1396	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1397	KM Mean (logged)					-3.257	KM Geo Mean					0.0385
1398	KM SD (logged)					3.833	95% Critical H Value (KM-Log)					7.152
1399	KM Standard Error of Mean (logged)					0.802	95% H-UCL (KM -Log)					14388
1400	KM SD (logged)					3.833	95% Critical H Value (KM-Log)					7.152
1401	KM Standard Error of Mean (logged)					0.802						
1402												
1403	<b>DL/2 Statistics</b>											
1404	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1405	Mean in Original Scale					0.439	Mean in Log Scale					-2.046
1406	SD in Original Scale					0.586	SD in Log Scale					2.194
1407	95% t UCL (Assumes normality)					0.636	95% H-Stat UCL					9.554
1408	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1409												
1410	<b>Nonparametric Distribution Free UCL Statistics</b>											
1411	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1412												
1413	<b>Suggested UCL to Use</b>											
1414	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					0.749						
1415												
1416	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1417	Recommendations are based upon data size, data distribution, and skewness.											
1418	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1419	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1420												
1421	<b>Aroclor 1254</b>											
1422												
1423	<b>General Statistics</b>											
1424	Total Number of Observations					27	Number of Distinct Observations					23
1425	Number of Detects					22	Number of Non-Detects					5
1426	Number of Distinct Detects					18	Number of Distinct Non-Detects					5
1427	Minimum Detect					0.023	Minimum Non-Detect					0.041
1428	Maximum Detect					2.8	Maximum Non-Detect					0.19
1429	Variance Detects					0.58	Percent Non-Detects					18.52%
1430	Mean Detects					0.872	SD Detects					0.761
1431	Median Detects					0.785	CV Detects					0.873

	A	B	C	D	E	F	G	H	I	J	K	L
1432	Skewness Detects					1.148	Kurtosis Detects					0.943
1433	Mean of Logged Detects					-0.677	SD of Logged Detects					1.283
1434												
1435	<b>Normal GOF Test on Detects Only</b>											
1436	Shapiro Wilk Test Statistic					0.886	<b>Shapiro Wilk GOF Test</b>					
1437	5% Shapiro Wilk Critical Value					0.911	Detected Data Not Normal at 5% Significance Level					
1438	Lilliefors Test Statistic					0.206	<b>Lilliefors GOF Test</b>					
1439	5% Lilliefors Critical Value					0.184	Detected Data Not Normal at 5% Significance Level					
1440	<b>Detected Data Not Normal at 5% Significance Level</b>											
1441												
1442	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1443	KM Mean					0.716	KM Standard Error of Mean					0.147
1444	KM SD					0.747	95% KM (BCA) UCL					0.959
1445	95% KM (t) UCL					0.967	95% KM (Percentile Bootstrap) UCL					0.965
1446	95% KM (z) UCL					0.958	95% KM Bootstrap t UCL					1.023
1447	90% KM Chebyshev UCL					1.158	95% KM Chebyshev UCL					1.357
1448	97.5% KM Chebyshev UCL					1.635	99% KM Chebyshev UCL					2.18
1449												
1450	<b>Gamma GOF Tests on Detected Observations Only</b>											
1451	A-D Test Statistic					0.399	<b>Anderson-Darling GOF Test</b>					
1452	5% A-D Critical Value					0.769	Detected data appear Gamma Distributed at 5% Significance Level					
1453	K-S Test Statistic					0.12	<b>Kolmogorov-Smirnov GOF</b>					
1454	5% K-S Critical Value					0.19	Detected data appear Gamma Distributed at 5% Significance Level					
1455	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1456												
1457	<b>Gamma Statistics on Detected Data Only</b>											
1458	k hat (MLE)					1.061	k star (bias corrected MLE)					0.947
1459	Theta hat (MLE)					0.822	Theta star (bias corrected MLE)					0.921
1460	nu hat (MLE)					46.68	nu star (bias corrected)					41.65
1461	Mean (detects)					0.872						
1462												
1463	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1464	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1465	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1466	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1467	This is especially true when the sample size is small.											
1468	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1469	Minimum					0.01	Mean					0.713
1470	Maximum					2.8	Median					0.55
1471	SD					0.764	CV					1.072
1472	k hat (MLE)					0.599	k star (bias corrected MLE)					0.557
1473	Theta hat (MLE)					1.189	Theta star (bias corrected MLE)					1.279
1474	nu hat (MLE)					32.37	nu star (bias corrected)					30.1
1475	Adjusted Level of Significance ( $\beta$ )					0.0401						
1476	Approximate Chi Square Value (30.10, $\alpha$ )					18.57	Adjusted Chi Square Value (30.10, $\beta$ )					18
1477	95% Gamma Approximate UCL (use when $n \geq 50$ )					1.155	95% Gamma Adjusted UCL (use when $n < 50$ )					1.193
1478												
1479	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1480	Mean (KM)					0.716	SD (KM)					0.747
1481	Variance (KM)					0.558	SE of Mean (KM)					0.147
1482	k hat (KM)					0.92	k star (KM)					0.842
1483	nu hat (KM)					49.65	nu star (KM)					45.47
1484	theta hat (KM)					0.779	theta star (KM)					0.851

	A	B	C	D	E	F	G	H	I	J	K	L	
1485	80% gamma percentile (KM)				1.167	90% gamma percentile (KM)				1.72			
1486	95% gamma percentile (KM)				2.281	99% gamma percentile (KM)				3.6			
1487													
1488	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1489	Approximate Chi Square Value (45.47, $\alpha$ )				31	Adjusted Chi Square Value (45.47, $\beta$ )				30.24			
1490	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				1.05	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				1.077			
1491													
1492	<b>Lognormal GOF Test on Detected Observations Only</b>												
1493	Shapiro Wilk Test Statistic				0.907	<b>Shapiro Wilk GOF Test</b>							
1494	5% Shapiro Wilk Critical Value				0.911	Detected Data Not Lognormal at 5% Significance Level							
1495	Lilliefors Test Statistic				0.183	<b>Lilliefors GOF Test</b>							
1496	5% Lilliefors Critical Value				0.184	Detected Data appear Lognormal at 5% Significance Level							
1497	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>												
1498													
1499	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1500	Mean in Original Scale				0.72	Mean in Log Scale				-1.105			
1501	SD in Original Scale				0.757	SD in Log Scale				1.475			
1502	95% t UCL (assumes normality of ROS data)				0.969	95% Percentile Bootstrap UCL				0.97			
1503	95% BCA Bootstrap UCL				1.015	95% Bootstrap t UCL				1.003			
1504	95% H-UCL (Log ROS)				2.48								
1505													
1506	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1507	KM Mean (logged)				-1.222	KM Geo Mean				0.295			
1508	KM SD (logged)				1.618	95% Critical H Value (KM-Log)				3.421			
1509	KM Standard Error of Mean (logged)				0.32	95% H-UCL (KM -Log)				3.228			
1510	KM SD (logged)				1.618	95% Critical H Value (KM-Log)				3.421			
1511	KM Standard Error of Mean (logged)				0.32								
1512													
1513	<b>DL/2 Statistics</b>												
1514	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>						
1515	Mean in Original Scale				0.718	Mean in Log Scale				-1.176			
1516	SD in Original Scale				0.759	SD in Log Scale				1.59			
1517	95% t UCL (Assumes normality)				0.967	95% H-Stat UCL				3.133			
1518	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
1519													
1520	<b>Nonparametric Distribution Free UCL Statistics</b>												
1521	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>												
1522													
1523	<b>Suggested UCL to Use</b>												
1524	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				1.077								
1525													
1526	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1527	Recommendations are based upon data size, data distribution, and skewness.												
1528	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1529	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
1530													
1531	<b>Aroclor 1260</b>												
1532													
1533	<b>General Statistics</b>												
1534	Total Number of Observations				66	Number of Distinct Observations				51			
1535	Number of Detects				61	Number of Non-Detects				5			
1536	Number of Distinct Detects				47	Number of Distinct Non-Detects				5			
1537	Minimum Detect				0.021	Minimum Non-Detect				0.041			

	A	B	C	D	E	F	G	H	I	J	K	L
1538				Maximum Detects	1.7					Maximum Non-Detect		0.19
1539				Variance Detects	0.0881					Percent Non-Detects		7.576%
1540				Mean Detects	0.217					SD Detects		0.297
1541				Median Detects	0.095					CV Detects		1.368
1542				Skewness Detects	2.893					Kurtosis Detects		10.57
1543				Mean of Logged Detects	-2.21					SD of Logged Detects		1.168
1544												
1545	<b>Normal GOF Test on Detects Only</b>											
1546				Shapiro Wilk Test Statistic	0.673					<b>Normal GOF Test on Detected Observations Only</b>		
1547				5% Shapiro Wilk P Value	0					Detected Data Not Normal at 5% Significance Level		
1548				Lilliefors Test Statistic	0.255					<b>Lilliefors GOF Test</b>		
1549				5% Lilliefors Critical Value	0.113					Detected Data Not Normal at 5% Significance Level		
1550	<b>Detected Data Not Normal at 5% Significance Level</b>											
1551												
1552	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1553				KM Mean	0.204					KM Standard Error of Mean		0.0356
1554				KM SD	0.287					95% KM (BCA) UCL		0.273
1555				95% KM (t) UCL	0.263					95% KM (Percentile Bootstrap) UCL		0.267
1556				95% KM (z) UCL	0.262					95% KM Bootstrap t UCL		0.288
1557				90% KM Chebyshev UCL	0.31					95% KM Chebyshev UCL		0.359
1558				97.5% KM Chebyshev UCL	0.426					99% KM Chebyshev UCL		0.558
1559												
1560	<b>Gamma GOF Tests on Detected Observations Only</b>											
1561				A-D Test Statistic	1.702					<b>Anderson-Darling GOF Test</b>		
1562				5% A-D Critical Value	0.786					Detected Data Not Gamma Distributed at 5% Significance Level		
1563				K-S Test Statistic	0.132					<b>Kolmogorov-Smirnov GOF</b>		
1564				5% K-S Critical Value	0.118					Detected Data Not Gamma Distributed at 5% Significance Level		
1565	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
1566												
1567	<b>Gamma Statistics on Detected Data Only</b>											
1568				k hat (MLE)	0.861					k star (bias corrected MLE)		0.83
1569				Theta hat (MLE)	0.252					Theta star (bias corrected MLE)		0.262
1570				nu hat (MLE)	105.1					nu star (bias corrected)		101.2
1571				Mean (detects)	0.217							
1572												
1573	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1574	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1575	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1576	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1577	This is especially true when the sample size is small.											
1578	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1579				Minimum	0.01					Mean		0.202
1580				Maximum	1.7					Median		0.085
1581				SD	0.29					CV		1.44
1582				k hat (MLE)	0.77					k star (bias corrected MLE)		0.745
1583				Theta hat (MLE)	0.262					Theta star (bias corrected MLE)		0.271
1584				nu hat (MLE)	101.6					nu star (bias corrected)		98.33
1585				Adjusted Level of Significance ( $\beta$ )	0.0464							
1586				Approximate Chi Square Value (98.33, $\alpha$ )	76.46					Adjusted Chi Square Value (98.33, $\beta$ )		76.03
1587				95% Gamma Approximate UCL (use when $n \geq 50$ )	0.259					95% Gamma Adjusted UCL (use when $n < 50$ )		0.261
1588												
1589	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1590				Mean (KM)	0.204					SD (KM)		0.287



	A	B	C	D	E	F	G	H	I	J	K	L
1591	Variance (KM)				0.0824	SE of Mean (KM)				0.0356		
1592	k hat (KM)				0.503	k star (KM)				0.49		
1593	nu hat (KM)				66.38	nu star (KM)				64.69		
1594	theta hat (KM)				0.405	theta star (KM)				0.415		
1595	80% gamma percentile (KM)				0.334	90% gamma percentile (KM)				0.553		
1596	95% gamma percentile (KM)				0.788	99% gamma percentile (KM)				1.365		
1597												
1598	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1599	Approximate Chi Square Value (64.69, $\alpha$ )				47.19	Adjusted Chi Square Value (64.69, $\beta$ )				46.86		
1600	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.279	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.281		
1601												
1602	<b>Lognormal GOF Test on Detected Observations Only</b>											
1603	Shapiro Wilk Approximate Test Statistic				0.936	<b>Shapiro Wilk GOF Test</b>						
1604	5% Shapiro Wilk P Value				0.00496	Detected Data Not Lognormal at 5% Significance Level						
1605	Lilliefors Test Statistic				0.111	<b>Lilliefors GOF Test</b>						
1606	5% Lilliefors Critical Value				0.113	Detected Data appear Lognormal at 5% Significance Level						
1607	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>											
1608												
1609	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1610	Mean in Original Scale				0.204	Mean in Log Scale				-2.288		
1611	SD in Original Scale				0.289	SD in Log Scale				1.157		
1612	95% t UCL (assumes normality of ROS data)				0.263	95% Percentile Bootstrap UCL				0.264		
1613	95% BCA Bootstrap UCL				0.286	95% Bootstrap t UCL				0.284		
1614	95% H-UCL (Log ROS)				0.273							
1615												
1616	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1617	KM Mean (logged)				-2.298	KM Geo Mean				0.1		
1618	KM SD (logged)				1.162	95% Critical H Value (KM-Log)				2.233		
1619	KM Standard Error of Mean (logged)				0.145	95% H-UCL (KM -Log)				0.272		
1620	KM SD (logged)				1.162	95% Critical H Value (KM-Log)				2.233		
1621	KM Standard Error of Mean (logged)				0.145							
1622												
1623	<b>DL/2 Statistics</b>											
1624	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
1625	Mean in Original Scale				0.204	Mean in Log Scale				-2.298		
1626	SD in Original Scale				0.289	SD in Log Scale				1.175		
1627	95% t UCL (Assumes normality)				0.263	95% H-Stat UCL				0.277		
1628	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1629												
1630	<b>Nonparametric Distribution Free UCL Statistics</b>											
1631	<b>Detected Data appear Approximate Lognormal Distributed at 5% Significance Level</b>											
1632												
1633	<b>Suggested UCL to Use</b>											
1634	KM H-UCL				0.272							
1635												
1636	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1637	Recommendations are based upon data size, data distribution, and skewness.											
1638	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1639	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1640												
1641	<b>Aldrin</b>											
1642												
1643	<b>General Statistics</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1644	Total Number of Observations					12	Number of Distinct Observations					10
1645	Number of Detects					9	Number of Non-Detects					3
1646	Number of Distinct Detects					8	Number of Distinct Non-Detects					2
1647	Minimum Detect					0.0058	Minimum Non-Detect					0.012
1648	Maximum Detect					0.021	Maximum Non-Detect					0.045
1649	Variance Detects					4.2065E-5	Percent Non-Detects					25%
1650	Mean Detects					0.013	SD Detects					0.00649
1651	Median Detects					0.016	CV Detects					0.497
1652	Skewness Detects					-0.135	Kurtosis Detects					-2.338
1653	Mean of Logged Detects					-4.471	SD of Logged Detects					0.566
1654												
1655	<b>Normal GOF Test on Detects Only</b>											
1656	Shapiro Wilk Test Statistic					0.802	<b>Shapiro Wilk GOF Test</b>					
1657	5% Shapiro Wilk Critical Value					0.829	Detected Data Not Normal at 5% Significance Level					
1658	Lilliefors Test Statistic					0.273	<b>Lilliefors GOF Test</b>					
1659	5% Lilliefors Critical Value					0.274	Detected Data appear Normal at 5% Significance Level					
1660	<b>Detected Data appear Approximate Normal at 5% Significance Level</b>											
1661												
1662	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1663	KM Mean					0.0118	KM Standard Error of Mean					0.00195
1664	KM SD					0.00611	95% KM (BCA) UCL					0.0149
1665	95% KM (t) UCL					0.0153	95% KM (Percentile Bootstrap) UCL					0.015
1666	95% KM (z) UCL					0.015	95% KM Bootstrap t UCL					0.0152
1667	90% KM Chebyshev UCL					0.0177	95% KM Chebyshev UCL					0.0203
1668	97.5% KM Chebyshev UCL					0.024	99% KM Chebyshev UCL					0.0313
1669												
1670	<b>Gamma GOF Tests on Detected Observations Only</b>											
1671	A-D Test Statistic					1.013	<b>Anderson-Darling GOF Test</b>					
1672	5% A-D Critical Value					0.725	Detected Data Not Gamma Distributed at 5% Significance Level					
1673	K-S Test Statistic					0.278	<b>Kolmogorov-Smirnov GOF</b>					
1674	5% K-S Critical Value					0.28	Detected data appear Gamma Distributed at 5% Significance Level					
1675	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1676												
1677	<b>Gamma Statistics on Detected Data Only</b>											
1678	k hat (MLE)					3.949	k star (bias corrected MLE)					2.707
1679	Theta hat (MLE)					0.0033	Theta star (bias corrected MLE)					0.00482
1680	nu hat (MLE)					71.09	nu star (bias corrected)					48.72
1681	Mean (detects)					0.013						
1682												
1683	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1684	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1685	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1686	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1687	This is especially true when the sample size is small.											
1688	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1689	Minimum					0.0058	Mean					0.0124
1690	Maximum					0.021	Median					0.0106
1691	SD					0.00567	CV					0.458
1692	k hat (MLE)					4.971	k star (bias corrected MLE)					3.784
1693	Theta hat (MLE)					0.00249	Theta star (bias corrected MLE)					0.00327
1694	nu hat (MLE)					119.3	nu star (bias corrected)					90.81
1695	Adjusted Level of Significance ( $\beta$ )					0.029						
1696	Approximate Chi Square Value (90.81, $\alpha$ )					69.84	Adjusted Chi Square Value (90.81, $\beta$ )					67.03

	A	B	C	D	E	F	G	H	I	J	K	L
1697	95% Gamma Approximate UCL (use when n>=50)					0.0161	95% Gamma Adjusted UCL (use when n<50)					0.0168
1698												
1699	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1700	Mean (KM)					0.0118	SD (KM)					0.00611
1701	Variance (KM)					3.7289E-5	SE of Mean (KM)					0.00195
1702	k hat (KM)					3.751	k star (KM)					2.869
1703	nu hat (KM)					90.03	nu star (KM)					68.86
1704	theta hat (KM)					0.00315	theta star (KM)					0.00412
1705	80% gamma percentile (KM)					0.017	90% gamma percentile (KM)					0.0212
1706	95% gamma percentile (KM)					0.0251	99% gamma percentile (KM)					0.0337
1707												
1708	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1709	Approximate Chi Square Value (68.86, $\alpha$ )					50.76	Adjusted Chi Square Value (68.86, $\beta$ )					48.39
1710	95% Gamma Approximate KM-UCL (use when n>=50)					0.016	95% Gamma Adjusted KM-UCL (use when n<50)					0.0168
1711												
1712	<b>Lognormal GOF Test on Detected Observations Only</b>											
1713	Shapiro Wilk Test Statistic					0.779	<b>Shapiro Wilk GOF Test</b>					
1714	5% Shapiro Wilk Critical Value					0.829	Detected Data Not Lognormal at 5% Significance Level					
1715	Lilliefors Test Statistic					0.279	<b>Lilliefors GOF Test</b>					
1716	5% Lilliefors Critical Value					0.274	Detected Data Not Lognormal at 5% Significance Level					
1717	<b>Detected Data Not Lognormal at 5% Significance Level</b>											
1718												
1719	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1720	Mean in Original Scale					0.0119	Mean in Log Scale					-4.558
1721	SD in Original Scale					0.00601	SD in Log Scale					0.521
1722	95% t UCL (assumes normality of ROS data)					0.015	95% Percentile Bootstrap UCL					0.0145
1723	95% BCA Bootstrap UCL					0.0148	95% Bootstrap t UCL					0.0153
1724	95% H-UCL (Log ROS)					0.0169						
1725												
1726	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1727	KM Mean (logged)					-4.579	KM Geo Mean					0.0103
1728	KM SD (logged)					0.534	95% Critical H Value (KM-Log)					2.184
1729	KM Standard Error of Mean (logged)					0.171	95% H-UCL (KM -Log)					0.0168
1730	KM SD (logged)					0.534	95% Critical H Value (KM-Log)					2.184
1731	KM Standard Error of Mean (logged)					0.171						
1732												
1733	<b>DL/2 Statistics</b>											
1734	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
1735	Mean in Original Scale					0.0127	Mean in Log Scale					-4.522
1736	SD in Original Scale					0.0069	SD in Log Scale					0.589
1737	95% t UCL (Assumes normality)					0.0162	95% H-Stat UCL					0.0193
1738	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1739												
1740	<b>Nonparametric Distribution Free UCL Statistics</b>											
1741	<b>Detected Data appear Approximate Normal Distributed at 5% Significance Level</b>											
1742												
1743	<b>Suggested UCL to Use</b>											
1744	95% KM (t) UCL					0.0153						
1745												
1746	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1747	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1748												
1749	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											

	A	B	C	D	E	F	G	H	I	J	K	L
1750	Recommendations are based upon data size, data distribution, and skewness.											
1751	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1752	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1753												
1754	<b>4,4'-DDT (p,p'-DDT)</b>											
1755												
1756	<b>General Statistics</b>											
1757	Total Number of Observations				84		Number of Distinct Observations				53	
1758	Number of Detects				44		Number of Non-Detects				40	
1759	Number of Distinct Detects				37		Number of Distinct Non-Detects				18	
1760	Minimum Detect				0.0053		Minimum Non-Detect				0.0045	
1761	Maximum Detect				54		Maximum Non-Detect				0.045	
1762	Variance Detects				66.18		Percent Non-Detects				47.62%	
1763	Mean Detects				1.264		SD Detects				8.135	
1764	Median Detects				0.03		CV Detects				6.438	
1765	Skewness Detects				6.633		Kurtosis Detects				44	
1766	Mean of Logged Detects				-3.572		SD of Logged Detects				1.531	
1767												
1768	<b>Normal GOF Test on Detects Only</b>											
1769	Shapiro Wilk Test Statistic				0.156		<b>Shapiro Wilk GOF Test</b>					
1770	5% Shapiro Wilk Critical Value				0.944		Detected Data Not Normal at 5% Significance Level					
1771	Lilliefors Test Statistic				0.53		<b>Lilliefors GOF Test</b>					
1772	5% Lilliefors Critical Value				0.132		Detected Data Not Normal at 5% Significance Level					
1773	<b>Detected Data Not Normal at 5% Significance Level</b>											
1774												
1775	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1776	KM Mean				0.664		KM Standard Error of Mean				0.646	
1777	KM SD				5.854		95% KM (BCA) UCL				1.953	
1778	95% KM (t) UCL				1.739		95% KM (Percentile Bootstrap) UCL				1.949	
1779	95% KM (z) UCL				1.727		95% KM Bootstrap t UCL				160	
1780	90% KM Chebyshev UCL				2.603		95% KM Chebyshev UCL				3.481	
1781	97.5% KM Chebyshev UCL				4.699		99% KM Chebyshev UCL				7.093	
1782												
1783	<b>Gamma GOF Tests on Detected Observations Only</b>											
1784	A-D Test Statistic				12.03		<b>Anderson-Darling GOF Test</b>					
1785	5% A-D Critical Value				0.916		Detected Data Not Gamma Distributed at 5% Significance Level					
1786	K-S Test Statistic				0.464		<b>Kolmogorov-Smirnov GOF</b>					
1787	5% K-S Critical Value				0.148		Detected Data Not Gamma Distributed at 5% Significance Level					
1788	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
1789												
1790	<b>Gamma Statistics on Detected Data Only</b>											
1791	k hat (MLE)				0.194		k star (bias corrected MLE)				0.196	
1792	Theta hat (MLE)				6.505		Theta star (bias corrected MLE)				6.441	
1793	nu hat (MLE)				17.09		nu star (bias corrected)				17.26	
1794	Mean (detects)				1.264							
1795												
1796	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1797	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1798	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1799	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1800	This is especially true when the sample size is small.											
1801	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1802	Minimum				0.0053		Mean				0.667	

	A	B	C	D	E	F	G	H	I	J	K	L
1803					Maximum	54					Median	0.01
1804					SD	5.889					CV	8.835
1805					k hat (MLE)	0.201					k star (bias corrected MLE)	0.202
1806					Theta hat (MLE)	3.316					Theta star (bias corrected MLE)	3.304
1807					nu hat (MLE)	33.77					nu star (bias corrected)	33.9
1808					Adjusted Level of Significance ( $\beta$ )	0.0471						
1809					Approximate Chi Square Value (33.90, $\alpha$ )	21.58					Adjusted Chi Square Value (33.90, $\beta$ )	21.41
1810					95% Gamma Approximate UCL (use when $n \geq 50$ )	1.047					95% Gamma Adjusted UCL (use when $n < 50$ )	1.055
1811												
1812	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1813					Mean (KM)	0.664					SD (KM)	5.854
1814					Variance (KM)	34.27					SE of Mean (KM)	0.646
1815					k hat (KM)	0.0129					k star (KM)	0.0203
1816					nu hat (KM)	2.162					nu star (KM)	3.418
1817					theta hat (KM)	51.61					theta star (KM)	32.64
1818					80% gamma percentile (KM)	3.2157E-4					90% gamma percentile (KM)	0.105
1819					95% gamma percentile (KM)	1.569					99% gamma percentile (KM)	18.52
1820												
1821	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1822					Approximate Chi Square Value (3.42, $\alpha$ )	0.506					Adjusted Chi Square Value (3.42, $\beta$ )	0.489
1823					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	4.483					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	4.643
1824												
1825	<b>Lognormal GOF Test on Detected Observations Only</b>											
1826					Shapiro Wilk Test Statistic	0.758					<b>Shapiro Wilk GOF Test</b>	
1827					5% Shapiro Wilk Critical Value	0.944					Detected Data Not Lognormal at 5% Significance Level	
1828					Lilliefors Test Statistic	0.144					<b>Lilliefors GOF Test</b>	
1829					5% Lilliefors Critical Value	0.132					Detected Data Not Lognormal at 5% Significance Level	
1830	<b>Detected Data Not Lognormal at 5% Significance Level</b>											
1831												
1832	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1833					Mean in Original Scale	0.663					Mean in Log Scale	-5.121
1834					SD in Original Scale	5.89					SD in Log Scale	2.045
1835					95% t UCL (assumes normality of ROS data)	1.731					95% Percentile Bootstrap UCL	1.947
1836					95% BCA Bootstrap UCL	2.595					95% Bootstrap t UCL	155
1837					95% H-UCL (Log ROS)	0.104						
1838												
1839	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1840					KM Mean (logged)	-4.423					KM Geo Mean	0.012
1841					KM SD (logged)	1.418					95% Critical H Value (KM-Log)	2.671
1842					KM Standard Error of Mean (logged)	0.157					95% H-UCL (KM -Log)	0.0497
1843					KM SD (logged)	1.418					95% Critical H Value (KM-Log)	2.671
1844					KM Standard Error of Mean (logged)	0.157						
1845												
1846	<b>DL/2 Statistics</b>											
1847	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1848					Mean in Original Scale	0.664					Mean in Log Scale	-4.619
1849					SD in Original Scale	5.89					SD in Log Scale	1.591
1850					95% t UCL (Assumes normality)	1.733					95% H-Stat UCL	0.0577
1851	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1852												
1853	<b>Nonparametric Distribution Free UCL Statistics</b>											
1854	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
1855												

	A	B	C	D	E	F	G	H	I	J	K	L
1856	<b>Suggested UCL to Use</b>											
1857	95% KM (Chebyshev) UCL					3.481						
1858												
1859	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1860	Recommendations are based upon data size, data distribution, and skewness.											
1861	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1862	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1863												
1864	<b>4,4-DDD (p,p-DDD)</b>											
1865												
1866	<b>General Statistics</b>											
1867	Total Number of Observations				84		Number of Distinct Observations				26	
1868	Number of Detects				2		Number of Non-Detects				82	
1869	Number of Distinct Detects				2		Number of Distinct Non-Detects				24	
1870	Minimum Detect				0.054		Minimum Non-Detect				0.0059	
1871	Maximum Detect				18		Maximum Non-Detect				0.045	
1872	Variance Detects				161		Percent Non-Detects				97.62%	
1873	Mean Detects				9.027		SD Detects				12.69	
1874	Median Detects				9.027		CV Detects				1.406	
1875	Skewness Detects				N/A		Kurtosis Detects				N/A	
1876	Mean of Logged Detects				-0.0142		SD of Logged Detects				4.108	
1877												
1878	<b>Warning: Data set has only 2 Detected Values.</b>											
1879	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											
1880												
1881												
1882	<b>Normal GOF Test on Detects Only</b>											
1883	<b>Not Enough Data to Perform GOF Test</b>											
1884												
1885	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1886	KM Mean				0.221		KM Standard Error of Mean				0.301	
1887	KM SD				1.952		95% KM (BCA) UCL				N/A	
1888	95% KM (t) UCL				0.722		95% KM (Percentile Bootstrap) UCL				N/A	
1889	95% KM (z) UCL				0.716		95% KM Bootstrap t UCL				N/A	
1890	90% KM Chebyshev UCL				1.124		95% KM Chebyshev UCL				1.533	
1891	97.5% KM Chebyshev UCL				2.101		99% KM Chebyshev UCL				3.217	
1892												
1893	<b>Gamma GOF Tests on Detected Observations Only</b>											
1894	<b>Not Enough Data to Perform GOF Test</b>											
1895												
1896	<b>Gamma Statistics on Detected Data Only</b>											
1897	k hat (MLE)				0.31		k star (bias corrected MLE)				N/A	
1898	Theta hat (MLE)				29.14		Theta star (bias corrected MLE)				N/A	
1899	nu hat (MLE)				1.239		nu star (bias corrected)				N/A	
1900	Mean (detects)				9.027							
1901												
1902	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1903	Mean (KM)				0.221		SD (KM)				1.952	
1904	Variance (KM)				3.809		SE of Mean (KM)				0.301	
1905	k hat (KM)				0.0128		k star (KM)				0.0203	
1906	nu hat (KM)				2.148		nu star (KM)				3.405	
1907	theta hat (KM)				17.26		theta star (KM)				10.89	
1908	80% gamma percentile (KM)				1.0280E-4		90% gamma percentile (KM)				0.0344	

	A	B	C	D	E	F	G	H	I	J	K	L
1909	95% gamma percentile (KM)					0.518	99% gamma percentile (KM)					6.157
1910												
1911	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1912							Adjusted Level of Significance ( $\beta$ )					0.0471
1913	Approximate Chi Square Value (3.40, $\alpha$ )				0.502	Adjusted Chi Square Value (3.40, $\beta$ )					0.485	
1914	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				1.497	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					1.551	
1915												
1916	<b>Lognormal GOF Test on Detected Observations Only</b>											
1917	<b>Not Enough Data to Perform GOF Test</b>											
1918												
1919	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1920	Mean in Original Scale				0.215	Mean in Log Scale					-41.5	
1921	SD in Original Scale				1.964	SD in Log Scale					9.038	
1922	95% t UCL (assumes normality of ROS data)				0.571	95% Percentile Bootstrap UCL					0.644	
1923	95% BCA Bootstrap UCL				1.071	95% Bootstrap t UCL					8.257E+10	
1924	95% H-UCL (Log ROS)				274243							
1925												
1926	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1927	KM Mean (logged)				-5.011	KM Geo Mean					0.00666	
1928	KM SD (logged)				0.9	95% Critical H Value (KM-Log)					2.145	
1929	KM Standard Error of Mean (logged)				0.139	95% H-UCL (KM -Log)					0.0123	
1930	KM SD (logged)				0.9	95% Critical H Value (KM-Log)					2.145	
1931	KM Standard Error of Mean (logged)				0.139							
1932												
1933	<b>DL/2 Statistics</b>											
1934	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1935	Mean in Original Scale				0.219	Mean in Log Scale					-5.448	
1936	SD in Original Scale				1.963	SD in Log Scale					1.018	
1937	95% t UCL (Assumes normality)				0.575	95% H-Stat UCL					0.0093	
1938	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1939												
1940	<b>Nonparametric Distribution Free UCL Statistics</b>											
1941	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
1942												
1943	<b>Suggested UCL to Use</b>											
1944	99% KM (Chebyshev) UCL				3.217							
1945												
1946	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1947	Recommendations are based upon data size, data distribution, and skewness.											
1948	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1949	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1950												
1951	<b>Endrin</b>											
1952												
1953	<b>General Statistics</b>											
1954	Total Number of Observations				84	Number of Distinct Observations					38	
1955	Number of Detects				28	Number of Non-Detects					56	
1956	Number of Distinct Detects				21	Number of Distinct Non-Detects					19	
1957	Minimum Detect				0.0062	Minimum Non-Detect					0.005	
1958	Maximum Detect				10	Maximum Non-Detect					0.045	
1959	Variance Detects				3.553	Percent Non-Detects					66.67%	
1960	Mean Detects				0.383	SD Detects					1.885	
1961	Median Detects				0.026	CV Detects					4.927	

	A	B	C	D	E	F	G	H	I	J	K	L
1962	Skewness Detects					5.291	Kurtosis Detects					27.99
1963	Mean of Logged Detects					-3.659	SD of Logged Detects					1.377
1964												
1965	<b>Normal GOF Test on Detects Only</b>											
1966	Shapiro Wilk Test Statistic					0.201	<b>Shapiro Wilk GOF Test</b>					
1967	5% Shapiro Wilk Critical Value					0.924	Detected Data Not Normal at 5% Significance Level					
1968	Lilliefors Test Statistic					0.529	<b>Lilliefors GOF Test</b>					
1969	5% Lilliefors Critical Value					0.164	Detected Data Not Normal at 5% Significance Level					
1970	<b>Detected Data Not Normal at 5% Significance Level</b>											
1971												
1972	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1973	KM Mean					0.131	KM Standard Error of Mean					0.12
1974	KM SD					1.083	95% KM (BCA) UCL					0.371
1975	95% KM (t) UCL					0.331	95% KM (Percentile Bootstrap) UCL					0.368
1976	95% KM (z) UCL					0.329	95% KM Bootstrap t UCL					11.38
1977	90% KM Chebyshev UCL					0.492	95% KM Chebyshev UCL					0.656
1978	97.5% KM Chebyshev UCL					0.883	99% KM Chebyshev UCL					1.329
1979												
1980	<b>Gamma GOF Tests on Detected Observations Only</b>											
1981	A-D Test Statistic					7.417	<b>Anderson-Darling GOF Test</b>					
1982	5% A-D Critical Value					0.873	Detected Data Not Gamma Distributed at 5% Significance Level					
1983	K-S Test Statistic					0.461	<b>Kolmogorov-Smirnov GOF</b>					
1984	5% K-S Critical Value					0.181	Detected Data Not Gamma Distributed at 5% Significance Level					
1985	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
1986												
1987	<b>Gamma Statistics on Detected Data Only</b>											
1988	k hat (MLE)					0.261	k star (bias corrected MLE)					0.257
1989	Theta hat (MLE)					1.464	Theta star (bias corrected MLE)					1.488
1990	nu hat (MLE)					14.64	nu star (bias corrected)					14.4
1991	Mean (detects)					0.383						
1992												
1993	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1994	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1995	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1996	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1997	This is especially true when the sample size is small.											
1998	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1999	Minimum					0.0062	Mean					0.134
2000	Maximum					10	Median					0.01
2001	SD					1.089	CV					8.119
2002	k hat (MLE)					0.302	k star (bias corrected MLE)					0.299
2003	Theta hat (MLE)					0.444	Theta star (bias corrected MLE)					0.449
2004	nu hat (MLE)					50.73	nu star (bias corrected)					50.25
2005	Adjusted Level of Significance ( $\beta$ )					0.0471						
2006	Approximate Chi Square Value (50.25, $\alpha$ )					34.97	Adjusted Chi Square Value (50.25, $\beta$ )					34.75
2007	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.193	95% Gamma Adjusted UCL (use when $n < 50$ )					0.194
2008												
2009	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2010	Mean (KM)					0.131	SD (KM)					1.083
2011	Variance (KM)					1.174	SE of Mean (KM)					0.12
2012	k hat (KM)					0.0146	k star (KM)					0.022
2013	nu hat (KM)					2.456	nu star (KM)					3.702
2014	theta hat (KM)					8.96	theta star (KM)					5.945



	A	B	C	D	E	F	G	H	I	J	K	L
2015	80% gamma percentile (KM)				1.3578E-4	90% gamma percentile (KM)				0.0286		
2016	95% gamma percentile (KM)				0.351	99% gamma percentile (KM)				3.612		
2017												
2018	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2019	Approximate Chi Square Value (3.70, $\alpha$ )				0.607	Adjusted Chi Square Value (3.70, $\beta$ )				0.587		
2020	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.798	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.825		
2021												
2022	<b>Lognormal GOF Test on Detected Observations Only</b>											
2023	Shapiro Wilk Test Statistic				0.696	<b>Shapiro Wilk GOF Test</b>						
2024	5% Shapiro Wilk Critical Value				0.924	Detected Data Not Lognormal at 5% Significance Level						
2025	Lilliefors Test Statistic				0.213	<b>Lilliefors GOF Test</b>						
2026	5% Lilliefors Critical Value				0.164	Detected Data Not Lognormal at 5% Significance Level						
2027	<b>Detected Data Not Lognormal at 5% Significance Level</b>											
2028												
2029	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2030	Mean in Original Scale				0.128	Mean in Log Scale				-5.977		
2031	SD in Original Scale				1.09	SD in Log Scale				2.007		
2032	95% t UCL (assumes normality of ROS data)				0.326	95% Percentile Bootstrap UCL				0.366		
2033	95% BCA Bootstrap UCL				0.487	95% Bootstrap t UCL				10.13		
2034	95% H-UCL (Log ROS)				0.04							
2035												
2036	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2037	KM Mean (logged)				-4.736	KM Geo Mean				0.00878		
2038	KM SD (logged)				1.096	95% Critical H Value (KM-Log)				2.329		
2039	KM Standard Error of Mean (logged)				0.122	95% H-UCL (KM -Log)				0.0212		
2040	KM SD (logged)				1.096	95% Critical H Value (KM-Log)				2.329		
2041	KM Standard Error of Mean (logged)				0.122							
2042												
2043	<b>DL/2 Statistics</b>											
2044	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2045	Mean in Original Scale				0.13	Mean in Log Scale				-4.972		
2046	SD in Original Scale				1.09	SD in Log Scale				1.259		
2047	95% t UCL (Assumes normality)				0.328	95% H-Stat UCL				0.0216		
2048	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2049												
2050	<b>Nonparametric Distribution Free UCL Statistics</b>											
2051	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
2052												
2053	<b>Suggested UCL to Use</b>											
2054	95% KM (Chebyshev) UCL				0.656							
2055												
2056	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2057	Recommendations are based upon data size, data distribution, and skewness.											
2058	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2059	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2060												
2061	<b>Benzo(a)anthracene</b>											
2062												
2063	<b>General Statistics</b>											
2064	Total Number of Observations				77	Number of Distinct Observations				56		
2065	Number of Detects				73	Number of Non-Detects				4		
2066	Number of Distinct Detects				54	Number of Distinct Non-Detects				4		
2067	Minimum Detect				0.14	Minimum Non-Detect				0.43		

	A	B	C	D	E	F	G	H	I	J	K	L	
2068				Maximum Detect	14					Maximum Non-Detect		2.3	
2069				Variance Detects	8.365					Percent Non-Detects		5.195%	
2070				Mean Detects	2.038					SD Detects		2.892	
2071				Median Detects	0.87					CV Detects		1.419	
2072				Skewness Detects	2.58					Kurtosis Detects		6.462	
2073				Mean of Logged Detects	0.0602					SD of Logged Detects		1.091	
2074													
2075	<b>Normal GOF Test on Detects Only</b>												
2076				Shapiro Wilk Test Statistic	0.626			<b>Normal GOF Test on Detected Observations Only</b>					
2077				5% Shapiro Wilk P Value	0			Detected Data Not Normal at 5% Significance Level					
2078				Lilliefors Test Statistic	0.273			<b>Lilliefors GOF Test</b>					
2079				5% Lilliefors Critical Value	0.104			Detected Data Not Normal at 5% Significance Level					
2080	<b>Detected Data Not Normal at 5% Significance Level</b>												
2081													
2082	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
2083				KM Mean	1.958			KM Standard Error of Mean				0.324	
2084				KM SD	2.819			95% KM (BCA) UCL				2.554	
2085				95% KM (t) UCL	2.497			95% KM (Percentile Bootstrap) UCL				2.54	
2086				95% KM (z) UCL	2.49			95% KM Bootstrap t UCL				2.629	
2087				90% KM Chebyshev UCL	2.929			95% KM Chebyshev UCL				3.368	
2088				97.5% KM Chebyshev UCL	3.979			99% KM Chebyshev UCL				5.177	
2089													
2090	<b>Gamma GOF Tests on Detected Observations Only</b>												
2091				A-D Test Statistic	3.016			<b>Anderson-Darling GOF Test</b>					
2092				5% A-D Critical Value	0.786			Detected Data Not Gamma Distributed at 5% Significance Level					
2093				K-S Test Statistic	0.181			<b>Kolmogorov-Smirnov GOF</b>					
2094				5% K-S Critical Value	0.108			Detected Data Not Gamma Distributed at 5% Significance Level					
2095	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>												
2096													
2097	<b>Gamma Statistics on Detected Data Only</b>												
2098				k hat (MLE)	0.897			k star (bias corrected MLE)				0.87	
2099				Theta hat (MLE)	2.271			Theta star (bias corrected MLE)				2.344	
2100				nu hat (MLE)	131			nu star (bias corrected)				127	
2101				Mean (detects)	2.038								
2102													
2103	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
2104	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2105	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
2106	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
2107	This is especially true when the sample size is small.												
2108	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
2109				Minimum	0.01			Mean				1.942	
2110				Maximum	14			Median				0.85	
2111				SD	2.846			CV				1.465	
2112				k hat (MLE)	0.788			k star (bias corrected MLE)				0.766	
2113				Theta hat (MLE)	2.463			Theta star (bias corrected MLE)				2.534	
2114				nu hat (MLE)	121.4			nu star (bias corrected)				118	
2115				Adjusted Level of Significance ( $\beta$ )	0.0469								
2116				Approximate Chi Square Value (118.02, $\alpha$ )	93.94			Adjusted Chi Square Value (118.02, $\beta$ )				93.53	
2117				95% Gamma Approximate UCL (use when $n \geq 50$ )	2.44			95% Gamma Adjusted UCL (use when $n < 50$ )				2.45	
2118													
2119	<b>Estimates of Gamma Parameters using KM Estimates</b>												
2120				Mean (KM)	1.958			SD (KM)				2.819	

	A	B	C	D	E	F	G	H	I	J	K	L
2121	Variance (KM)				7.945	SE of Mean (KM)				0.324		
2122	k hat (KM)				0.483	k star (KM)				0.472		
2123	nu hat (KM)				74.32	nu star (KM)				72.76		
2124	theta hat (KM)				4.057	theta star (KM)				4.145		
2125	80% gamma percentile (KM)				3.206	90% gamma percentile (KM)				5.359		
2126	95% gamma percentile (KM)				7.675	99% gamma percentile (KM)				13.4		
2127												
2128	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2129	Approximate Chi Square Value (72.76, $\alpha$ )				54.12	Adjusted Chi Square Value (72.76, $\beta$ )				53.81		
2130	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				2.633	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				2.648		
2131												
2132	<b>Lognormal GOF Test on Detected Observations Only</b>											
2133	Shapiro Wilk Approximate Test Statistic				0.955	<b>Shapiro Wilk GOF Test</b>						
2134	5% Shapiro Wilk P Value				0.0294	Detected Data Not Lognormal at 5% Significance Level						
2135	Lilliefors Test Statistic				0.0993	<b>Lilliefors GOF Test</b>						
2136	5% Lilliefors Critical Value				0.104	Detected Data appear Lognormal at 5% Significance Level						
2137	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>											
2138												
2139	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2140	Mean in Original Scale				1.957	Mean in Log Scale				0.0134		
2141	SD in Original Scale				2.837	SD in Log Scale				1.086		
2142	95% t UCL (assumes normality of ROS data)				2.495	95% Percentile Bootstrap UCL				2.51		
2143	95% BCA Bootstrap UCL				2.624	95% Bootstrap t UCL				2.636		
2144	95% H-UCL (Log ROS)				2.449							
2145												
2146	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2147	KM Mean (logged)				0.0103	KM Geo Mean				1.01		
2148	KM SD (logged)				1.086	95% Critical H Value (KM-Log)				2.348		
2149	KM Standard Error of Mean (logged)				0.125	95% H-UCL (KM -Log)				2.441		
2150	KM SD (logged)				1.086	95% Critical H Value (KM-Log)				2.348		
2151	KM Standard Error of Mean (logged)				0.125							
2152												
2153	<b>DL/2 Statistics</b>											
2154	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
2155	Mean in Original Scale				1.962	Mean in Log Scale				0.0157		
2156	SD in Original Scale				2.835	SD in Log Scale				1.092		
2157	95% t UCL (Assumes normality)				2.5	95% H-Stat UCL				2.475		
2158	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2159												
2160	<b>Nonparametric Distribution Free UCL Statistics</b>											
2161	<b>Detected Data appear Approximate Lognormal Distributed at 5% Significance Level</b>											
2162												
2163	<b>Suggested UCL to Use</b>											
2164	KM H-UCL				2.441							
2165												
2166	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2167	Recommendations are based upon data size, data distribution, and skewness.											
2168	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2169	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2170												
2171	<b>Benzo(b)fluoranthene</b>											
2172												
2173	<b>General Statistics</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
2174	Total Number of Observations					80	Number of Distinct Observations					60
2175	Number of Detects					76	Number of Non-Detects					4
2176	Number of Distinct Detects					58	Number of Distinct Non-Detects					4
2177	Minimum Detect					0.1	Minimum Non-Detect					0.43
2178	Maximum Detect					14	Maximum Non-Detect					2.3
2179	Variance Detects					7.4	Percent Non-Detects					5%
2180	Mean Detects					2.061	SD Detects					2.72
2181	Median Detects					1	CV Detects					1.32
2182	Skewness Detects					2.582	Kurtosis Detects					6.949
2183	Mean of Logged Detects					0.132	SD of Logged Detects					1.064
2184												
2185	<b>Normal GOF Test on Detects Only</b>											
2186	Shapiro Wilk Test Statistic					0.657	<b>Normal GOF Test on Detected Observations Only</b>					
2187	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
2188	Lilliefors Test Statistic					0.265	<b>Lilliefors GOF Test</b>					
2189	5% Lilliefors Critical Value					0.102	Detected Data Not Normal at 5% Significance Level					
2190	<b>Detected Data Not Normal at 5% Significance Level</b>											
2191												
2192	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2193	KM Mean					1.985	KM Standard Error of Mean					0.299
2194	KM SD					2.656	95% KM (BCA) UCL					2.535
2195	95% KM (t) UCL					2.482	95% KM (Percentile Bootstrap) UCL					2.507
2196	95% KM (z) UCL					2.476	95% KM Bootstrap t UCL					2.574
2197	90% KM Chebyshev UCL					2.882	95% KM Chebyshev UCL					3.288
2198	97.5% KM Chebyshev UCL					3.852	99% KM Chebyshev UCL					4.96
2199												
2200	<b>Gamma GOF Tests on Detected Observations Only</b>											
2201	A-D Test Statistic					2.405	<b>Anderson-Darling GOF Test</b>					
2202	5% A-D Critical Value					0.782	Detected Data Not Gamma Distributed at 5% Significance Level					
2203	K-S Test Statistic					0.175	<b>Kolmogorov-Smirnov GOF</b>					
2204	5% K-S Critical Value					0.106	Detected Data Not Gamma Distributed at 5% Significance Level					
2205	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2206												
2207	<b>Gamma Statistics on Detected Data Only</b>											
2208	k hat (MLE)					0.978	k star (bias corrected MLE)					0.948
2209	Theta hat (MLE)					2.108	Theta star (bias corrected MLE)					2.174
2210	nu hat (MLE)					148.7	nu star (bias corrected)					144.1
2211	Mean (detects)					2.061						
2212												
2213	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2214	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2215	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2216	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2217	This is especially true when the sample size is small.											
2218	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2219	Minimum					0.01	Mean					1.97
2220	Maximum					14	Median					1
2221	SD					2.681	CV					1.361
2222	k hat (MLE)					0.854	k star (bias corrected MLE)					0.831
2223	Theta hat (MLE)					2.306	Theta star (bias corrected MLE)					2.371
2224	nu hat (MLE)					136.7	nu star (bias corrected)					132.9
2225	Adjusted Level of Significance ( $\beta$ )					0.047						
2226	Approximate Chi Square Value (132.89, $\alpha$ )					107.3	Adjusted Chi Square Value (132.89, $\beta$ )					106.8

	A	B	C	D	E	F	G	H	I	J	K	L
2227	95% Gamma Approximate UCL (use when n>=50)					2.44	95% Gamma Adjusted UCL (use when n<50)					2.45
2228												
2229	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2230	Mean (KM)					1.985	SD (KM)					2.656
2231	Variance (KM)					7.057	SE of Mean (KM)					0.299
2232	k hat (KM)					0.558	k star (KM)					0.546
2233	nu hat (KM)					89.3	nu star (KM)					87.28
2234	theta hat (KM)					3.556	theta star (KM)					3.638
2235	80% gamma percentile (KM)					3.268	90% gamma percentile (KM)					5.271
2236	95% gamma percentile (KM)					7.39	99% gamma percentile (KM)					12.56
2237												
2238	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2239	Approximate Chi Square Value (87.28, $\alpha$ )					66.74	Adjusted Chi Square Value (87.28, $\beta$ )					66.41
2240	95% Gamma Approximate KM-UCL (use when n>=50)					2.595	95% Gamma Adjusted KM-UCL (use when n<50)					2.608
2241												
2242	<b>Lognormal GOF Test on Detected Observations Only</b>											
2243	Shapiro Wilk Approximate Test Statistic					0.974	<b>Shapiro Wilk GOF Test</b>					
2244	5% Shapiro Wilk P Value					0.338	Detected Data appear Lognormal at 5% Significance Level					
2245	Lilliefors Test Statistic					0.106	<b>Lilliefors GOF Test</b>					
2246	5% Lilliefors Critical Value					0.102	Detected Data Not Lognormal at 5% Significance Level					
2247	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>											
2248												
2249	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2250	Mean in Original Scale					1.983	Mean in Log Scale					0.0846
2251	SD in Original Scale					2.673	SD in Log Scale					1.062
2252	95% t UCL (assumes normality of ROS data)					2.48	95% Percentile Bootstrap UCL					2.499
2253	95% BCA Bootstrap UCL					2.57	95% Bootstrap t UCL					2.632
2254	95% H-UCL (Log ROS)					2.528						
2255												
2256	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2257	KM Mean (logged)					0.0816	KM Geo Mean					1.085
2258	KM SD (logged)					1.064	95% Critical H Value (KM-Log)					2.332
2259	KM Standard Error of Mean (logged)					0.121	95% H-UCL (KM -Log)					2.525
2260	KM SD (logged)					1.064	95% Critical H Value (KM-Log)					2.332
2261	KM Standard Error of Mean (logged)					0.121						
2262												
2263	<b>DL/2 Statistics</b>											
2264	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2265	Mean in Original Scale					1.987	Mean in Log Scale					0.0852
2266	SD in Original Scale					2.672	SD in Log Scale					1.068
2267	95% t UCL (Assumes normality)					2.484	95% H-Stat UCL					2.552
2268	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2269												
2270	<b>Nonparametric Distribution Free UCL Statistics</b>											
2271	<b>Detected Data appear Approximate Lognormal Distributed at 5% Significance Level</b>											
2272												
2273	<b>Suggested UCL to Use</b>											
2274	KM H-UCL					2.525						
2275												
2276	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2277	Recommendations are based upon data size, data distribution, and skewness.											
2278	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2279	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

	A	B	C	D	E	F	G	H	I	J	K	L
2280												
2281	<b>Benzo(k)fluoranthene</b>											
2282												
2283	<b>General Statistics</b>											
2284	Total Number of Observations				58		Number of Distinct Observations				45	
2285	Number of Detects				53		Number of Non-Detects				5	
2286	Number of Distinct Detects				42		Number of Distinct Non-Detects				5	
2287	Minimum Detect				0.12		Minimum Non-Detect				0.43	
2288	Maximum Detect				6.5		Maximum Non-Detect				2.3	
2289	Variance Detects				1.816		Percent Non-Detects				8.621%	
2290	Mean Detects				1.057		SD Detects				1.347	
2291	Median Detects				0.55		CV Detects				1.275	
2292	Skewness Detects				2.486		Kurtosis Detects				6.138	
2293	Mean of Logged Detects				-0.469		SD of Logged Detects				0.973	
2294												
2295	<b>Normal GOF Test on Detects Only</b>											
2296	Shapiro Wilk Test Statistic				0.653		<b>Normal GOF Test on Detected Observations Only</b>					
2297	5% Shapiro Wilk P Value				2.887E-15		Detected Data Not Normal at 5% Significance Level					
2298	Lilliefors Test Statistic				0.279		<b>Lilliefors GOF Test</b>					
2299	5% Lilliefors Critical Value				0.121		Detected Data Not Normal at 5% Significance Level					
2300	<b>Detected Data Not Normal at 5% Significance Level</b>											
2301												
2302	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2303	KM Mean				1.002		KM Standard Error of Mean				0.171	
2304	KM SD				1.291		95% KM (BCA) UCL				1.312	
2305	95% KM (t) UCL				1.288		95% KM (Percentile Bootstrap) UCL				1.287	
2306	95% KM (z) UCL				1.284		95% KM Bootstrap t UCL				1.39	
2307	90% KM Chebyshev UCL				1.516		95% KM Chebyshev UCL				1.749	
2308	97.5% KM Chebyshev UCL				2.073		99% KM Chebyshev UCL				2.708	
2309												
2310	<b>Gamma GOF Tests on Detected Observations Only</b>											
2311	A-D Test Statistic				2.338		<b>Anderson-Darling GOF Test</b>					
2312	5% A-D Critical Value				0.778		Detected Data Not Gamma Distributed at 5% Significance Level					
2313	K-S Test Statistic				0.178		<b>Kolmogorov-Smirnov GOF</b>					
2314	5% K-S Critical Value				0.125		Detected Data Not Gamma Distributed at 5% Significance Level					
2315	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2316												
2317	<b>Gamma Statistics on Detected Data Only</b>											
2318	k hat (MLE)				1.09		k star (bias corrected MLE)				1.041	
2319	Theta hat (MLE)				0.969		Theta star (bias corrected MLE)				1.015	
2320	nu hat (MLE)				115.6		nu star (bias corrected)				110.3	
2321	Mean (detects)				1.057							
2322												
2323	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2324	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2325	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2326	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2327	This is especially true when the sample size is small.											
2328	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2329	Minimum				0.01		Mean				0.987	
2330	Maximum				6.5		Median				0.478	
2331	SD				1.308		CV				1.326	
2332	k hat (MLE)				0.975		k star (bias corrected MLE)				0.936	

	A	B	C	D	E	F	G	H	I	J	K	L
2333	Theta hat (MLE)				1.012	Theta star (bias corrected MLE)				1.054		
2334	nu hat (MLE)				113.1	nu star (bias corrected)				108.6		
2335	Adjusted Level of Significance ( $\beta$ )				0.0459							
2336	Approximate Chi Square Value (108.62, $\alpha$ )				85.56	Adjusted Chi Square Value (108.62, $\beta$ )				85.04		
2337	95% Gamma Approximate UCL (use when $n \geq 50$ )				1.253	95% Gamma Adjusted UCL (use when $n < 50$ )				1.261		
2338												
2339	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2340	Mean (KM)				1.002	SD (KM)				1.291		
2341	Variance (KM)				1.667	SE of Mean (KM)				0.171		
2342	k hat (KM)				0.602	k star (KM)				0.582		
2343	nu hat (KM)				69.82	nu star (KM)				67.54		
2344	theta hat (KM)				1.664	theta star (KM)				1.72		
2345	80% gamma percentile (KM)				1.651	90% gamma percentile (KM)				2.623		
2346	95% gamma percentile (KM)				3.644	99% gamma percentile (KM)				6.119		
2347												
2348	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2349	Approximate Chi Square Value (67.54, $\alpha$ )				49.63	Adjusted Chi Square Value (67.54, $\beta$ )				49.23		
2350	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				1.363	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				1.374		
2351												
2352	<b>Lognormal GOF Test on Detected Observations Only</b>											
2353	Shapiro Wilk Approximate Test Statistic				0.947	<b>Shapiro Wilk GOF Test</b>						
2354	5% Shapiro Wilk P Value				0.0351	Detected Data Not Lognormal at 5% Significance Level						
2355	Lilliefors Test Statistic				0.103	<b>Lilliefors GOF Test</b>						
2356	5% Lilliefors Critical Value				0.121	Detected Data appear Lognormal at 5% Significance Level						
2357	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>											
2358												
2359	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2360	Mean in Original Scale				1	Mean in Log Scale				-0.511		
2361	SD in Original Scale				1.301	SD in Log Scale				0.943		
2362	95% t UCL (assumes normality of ROS data)				1.285	95% Percentile Bootstrap UCL				1.298		
2363	95% BCA Bootstrap UCL				1.351	95% Bootstrap t UCL				1.389		
2364	95% H-UCL (Log ROS)				1.242							
2365												
2366	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2367	KM Mean (logged)				-0.519	KM Geo Mean				0.595		
2368	KM SD (logged)				0.951	95% Critical H Value (KM-Log)				2.283		
2369	KM Standard Error of Mean (logged)				0.128	95% H-UCL (KM -Log)				1.247		
2370	KM SD (logged)				0.951	95% Critical H Value (KM-Log)				2.283		
2371	KM Standard Error of Mean (logged)				0.128							
2372												
2373	<b>DL/2 Statistics</b>											
2374	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
2375	Mean in Original Scale				1.016	Mean in Log Scale				-0.492		
2376	SD in Original Scale				1.298	SD in Log Scale				0.952		
2377	95% t UCL (Assumes normality)				1.301	95% H-Stat UCL				1.282		
2378	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2379												
2380	<b>Nonparametric Distribution Free UCL Statistics</b>											
2381	<b>Detected Data appear Approximate Lognormal Distributed at 5% Significance Level</b>											
2382												
2383	<b>Suggested UCL to Use</b>											
2384	KM H-UCL				1.247							
2385												

	A	B	C	D	E	F	G	H	I	J	K	L				
2386	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.															
2387	Recommendations are based upon data size, data distribution, and skewness.															
2388	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).															
2389	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.															
2390																
2391	<b>Benzo(a)pyrene</b>															
2392																
2393	<b>General Statistics</b>															
2394	Total Number of Observations				75				Number of Distinct Observations				58			
2395	Number of Detects				70				Number of Non-Detects				5			
2396	Number of Distinct Detects				56				Number of Distinct Non-Detects				5			
2397	Minimum Detect				0.11				Minimum Non-Detect				0.43			
2398	Maximum Detect				11				Maximum Non-Detect				2.3			
2399	Variance Detects				5.136				Percent Non-Detects				6.667%			
2400	Mean Detects				1.788				SD Detects				2.266			
2401	Median Detects				0.88				CV Detects				1.268			
2402	Skewness Detects				2.414				Kurtosis Detects				5.73			
2403	Mean of Logged Detects				0.0231				SD of Logged Detects				1.032			
2404																
2405	<b>Normal GOF Test on Detects Only</b>															
2406	Shapiro Wilk Test Statistic				0.669				<b>Normal GOF Test on Detected Observations Only</b>							
2407	5% Shapiro Wilk P Value				0				Detected Data Not Normal at 5% Significance Level							
2408	Lilliefors Test Statistic				0.247				<b>Lilliefors GOF Test</b>							
2409	5% Lilliefors Critical Value				0.106				Detected Data Not Normal at 5% Significance Level							
2410	<b>Detected Data Not Normal at 5% Significance Level</b>															
2411																
2412	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>															
2413	KM Mean				1.704				KM Standard Error of Mean				0.256			
2414	KM SD				2.198				95% KM (BCA) UCL				2.126			
2415	95% KM (t) UCL				2.13				95% KM (Percentile Bootstrap) UCL				2.15			
2416	95% KM (z) UCL				2.124				95% KM Bootstrap t UCL				2.226			
2417	90% KM Chebyshev UCL				2.471				95% KM Chebyshev UCL				2.819			
2418	97.5% KM Chebyshev UCL				3.301				99% KM Chebyshev UCL				4.249			
2419																
2420	<b>Gamma GOF Tests on Detected Observations Only</b>															
2421	A-D Test Statistic				2.196				<b>Anderson-Darling GOF Test</b>							
2422	5% A-D Critical Value				0.78				Detected Data Not Gamma Distributed at 5% Significance Level							
2423	K-S Test Statistic				0.155				<b>Kolmogorov-Smirnov GOF</b>							
2424	5% K-S Critical Value				0.109				Detected Data Not Gamma Distributed at 5% Significance Level							
2425	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>															
2426																
2427	<b>Gamma Statistics on Detected Data Only</b>															
2428	k hat (MLE)				1.031				k star (bias corrected MLE)				0.996			
2429	Theta hat (MLE)				1.734				Theta star (bias corrected MLE)				1.794			
2430	nu hat (MLE)				144.3				nu star (bias corrected)				139.5			
2431	Mean (detects)				1.788											
2432																
2433	<b>Gamma ROS Statistics using Imputed Non-Detects</b>															
2434	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs															
2435	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)															
2436	For such situations, GROS method may yield incorrect values of UCLs and BTVs															
2437	This is especially true when the sample size is small.															
2438	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates															



	A	B	C	D	E	F	G	H	I	J	K	L	
2439					Minimum	0.01					Mean	1.686	
2440					Maximum	11					Median	0.84	
2441					SD	2.222					CV	1.318	
2442					k hat (MLE)	0.888					k star (bias corrected MLE)	0.862	
2443					Theta hat (MLE)	1.898					Theta star (bias corrected MLE)	1.957	
2444					nu hat (MLE)	133.2					nu star (bias corrected)	129.2	
2445					Adjusted Level of Significance ( $\beta$ )	0.0468							
2446					Approximate Chi Square Value (129.23, $\alpha$ )	104					Adjusted Chi Square Value (129.23, $\beta$ )	103.5	
2447					95% Gamma Approximate UCL (use when $n \geq 50$ )	2.096					95% Gamma Adjusted UCL (use when $n < 50$ )	2.105	
2448													
2449					<b>Estimates of Gamma Parameters using KM Estimates</b>								
2450					Mean (KM)	1.704					SD (KM)	2.198	
2451					Variance (KM)	4.833					SE of Mean (KM)	0.256	
2452					k hat (KM)	0.6					k star (KM)	0.585	
2453					nu hat (KM)	90.07					nu star (KM)	87.8	
2454					theta hat (KM)	2.837					theta star (KM)	2.91	
2455					80% gamma percentile (KM)	2.808					90% gamma percentile (KM)	4.455	
2456					95% gamma percentile (KM)	6.185					99% gamma percentile (KM)	10.38	
2457													
2458					<b>Gamma Kaplan-Meier (KM) Statistics</b>								
2459					Approximate Chi Square Value (87.80, $\alpha$ )	67.2					Adjusted Chi Square Value (87.80, $\beta$ )	66.85	
2460					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	2.226					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	2.238	
2461													
2462					<b>Lognormal GOF Test on Detected Observations Only</b>								
2463					Shapiro Wilk Approximate Test Statistic	0.97					<b>Shapiro Wilk GOF Test</b>		
2464					5% Shapiro Wilk P Value	0.258					Detected Data appear Lognormal at 5% Significance Level		
2465					Lilliefors Test Statistic	0.0899					<b>Lilliefors GOF Test</b>		
2466					5% Lilliefors Critical Value	0.106					Detected Data appear Lognormal at 5% Significance Level		
2467					<b>Detected Data appear Lognormal at 5% Significance Level</b>								
2468													
2469					<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>								
2470					Mean in Original Scale	1.702					Mean in Log Scale	-0.0306	
2471					SD in Original Scale	2.213					SD in Log Scale	1.023	
2472					95% t UCL (assumes normality of ROS data)	2.127					95% Percentile Bootstrap UCL	2.129	
2473					95% BCA Bootstrap UCL	2.218					95% Bootstrap t UCL	2.228	
2474					95% H-UCL (Log ROS)	2.147							
2475													
2476					<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>								
2477					KM Mean (logged)	-0.0356					KM Geo Mean	0.965	
2478					KM SD (logged)	1.028					95% Critical H Value (KM-Log)	2.286	
2479					KM Standard Error of Mean (logged)	0.121					95% H-UCL (KM -Log)	2.151	
2480					KM SD (logged)	1.028					95% Critical H Value (KM-Log)	2.286	
2481					KM Standard Error of Mean (logged)	0.121							
2482													
2483					<b>DL/2 Statistics</b>								
2484					<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>		
2485					Mean in Original Scale	1.707					Mean in Log Scale	-0.0277	
2486					SD in Original Scale	2.211					SD in Log Scale	1.029	
2487					95% t UCL (Assumes normality)	2.133					95% H-Stat UCL	2.171	
2488					<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>								
2489													
2490					<b>Nonparametric Distribution Free UCL Statistics</b>								
2491					<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>								

	A	B	C	D	E	F	G	H	I	J	K	L		
2492														
2493	<b>Suggested UCL to Use</b>													
2494					KM H-UCL	2.151								
2495														
2496	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.													
2497	Recommendations are based upon data size, data distribution, and skewness.													
2498	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).													
2499	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.													
2500														
2501	<b>Chrysene</b>													
2502														
2503	<b>General Statistics</b>													
2504	Total Number of Observations				79	Number of Distinct Observations				62				
2505	Number of Detects				74	Number of Non-Detects				5				
2506	Number of Distinct Detects				60	Number of Distinct Non-Detects				5				
2507	Minimum Detect				0.078	Minimum Non-Detect				0.43				
2508	Maximum Detect				12	Maximum Non-Detect				2.3				
2509	Variance Detects				5.854	Percent Non-Detects				6.329%				
2510	Mean Detects				1.827	SD Detects				2.419				
2511	Median Detects				0.85	CV Detects				1.324				
2512	Skewness Detects				2.536	Kurtosis Detects				6.321				
2513	Mean of Logged Detects				0.0236	SD of Logged Detects				1.043				
2514														
2515	<b>Normal GOF Test on Detects Only</b>													
2516	Shapiro Wilk Test Statistic				0.645	<b>Normal GOF Test on Detected Observations Only</b>								
2517	5% Shapiro Wilk P Value				0	Detected Data Not Normal at 5% Significance Level								
2518	Lilliefors Test Statistic				0.248	<b>Lilliefors GOF Test</b>								
2519	5% Lilliefors Critical Value				0.103	Detected Data Not Normal at 5% Significance Level								
2520	<b>Detected Data Not Normal at 5% Significance Level</b>													
2521														
2522	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>													
2523	KM Mean				1.744	KM Standard Error of Mean				0.266				
2524	KM SD				2.349	95% KM (BCA) UCL				2.22				
2525	95% KM (t) UCL				2.188	95% KM (Percentile Bootstrap) UCL				2.194				
2526	95% KM (z) UCL				2.182	95% KM Bootstrap t UCL				2.33				
2527	90% KM Chebyshev UCL				2.543	95% KM Chebyshev UCL				2.905				
2528	97.5% KM Chebyshev UCL				3.407	99% KM Chebyshev UCL				4.394				
2529														
2530	<b>Gamma GOF Tests on Detected Observations Only</b>													
2531	A-D Test Statistic				2.756	<b>Anderson-Darling GOF Test</b>								
2532	5% A-D Critical Value				0.781	Detected Data Not Gamma Distributed at 5% Significance Level								
2533	K-S Test Statistic				0.169	<b>Kolmogorov-Smirnov GOF</b>								
2534	5% K-S Critical Value				0.107	Detected Data Not Gamma Distributed at 5% Significance Level								
2535	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>													
2536														
2537	<b>Gamma Statistics on Detected Data Only</b>													
2538	k hat (MLE)				0.997	k star (bias corrected MLE)				0.966				
2539	Theta hat (MLE)				1.831	Theta star (bias corrected MLE)				1.891				
2540	nu hat (MLE)				147.6	nu star (bias corrected)				143				
2541	Mean (detects)				1.827									
2542														
2543	<b>Gamma ROS Statistics using Imputed Non-Detects</b>													
2544	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs													

	A	B	C	D	E	F	G	H	I	J	K	L
2545	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2546	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2547	This is especially true when the sample size is small.											
2548	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2549		Minimum			0.01					Mean		1.727
2550		Maximum			12					Median		0.81
2551		SD			2.373					CV		1.374
2552		k hat (MLE)			0.868					k star (bias corrected MLE)		0.843
2553		Theta hat (MLE)			1.99					Theta star (bias corrected MLE)		2.048
2554		nu hat (MLE)			137.1					nu star (bias corrected)		133.2
2555		Adjusted Level of Significance ( $\beta$ )			0.047							
2556		Approximate Chi Square Value (133.25, $\alpha$ )			107.6					Adjusted Chi Square Value (133.25, $\beta$ )		107.2
2557		95% Gamma Approximate UCL (use when $n \geq 50$ )			2.139					95% Gamma Adjusted UCL (use when $n < 50$ )		2.147
2558												
2559	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2560		Mean (KM)			1.744					SD (KM)		2.349
2561		Variance (KM)			5.518					SE of Mean (KM)		0.266
2562		k hat (KM)			0.551					k star (KM)		0.539
2563		nu hat (KM)			87.13					nu star (KM)		85.16
2564		theta hat (KM)			3.163					theta star (KM)		3.237
2565		80% gamma percentile (KM)			2.872					90% gamma percentile (KM)		4.645
2566		95% gamma percentile (KM)			6.524					99% gamma percentile (KM)		11.11
2567												
2568	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2569		Approximate Chi Square Value (85.16, $\alpha$ )			64.89					Adjusted Chi Square Value (85.16, $\beta$ )		64.56
2570		95% Gamma Approximate KM-UCL (use when $n \geq 50$ )			2.289					95% Gamma Adjusted KM-UCL (use when $n < 50$ )		2.301
2571												
2572	<b>Lognormal GOF Test on Detected Observations Only</b>											
2573		Shapiro Wilk Approximate Test Statistic			0.97					<b>Shapiro Wilk GOF Test</b>		
2574		5% Shapiro Wilk P Value			0.234					Detected Data appear Lognormal at 5% Significance Level		
2575		Lilliefors Test Statistic			0.0942					<b>Lilliefors GOF Test</b>		
2576		5% Lilliefors Critical Value			0.103					Detected Data appear Lognormal at 5% Significance Level		
2577	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2578												
2579	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2580		Mean in Original Scale			1.742					Mean in Log Scale		-0.0286
2581		SD in Original Scale			2.364					SD in Log Scale		1.035
2582		95% t UCL (assumes normality of ROS data)			2.185					95% Percentile Bootstrap UCL		2.183
2583		95% BCA Bootstrap UCL			2.29					95% Bootstrap t UCL		2.292
2584		95% H-UCL (Log ROS)			2.175							
2585												
2586	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2587		KM Mean (logged)			-0.0324					KM Geo Mean		0.968
2588		KM SD (logged)			1.039					95% Critical H Value (KM-Log)		2.305
2589		KM Standard Error of Mean (logged)			0.119					95% H-UCL (KM -Log)		2.18
2590		KM SD (logged)			1.039					95% Critical H Value (KM-Log)		2.305
2591		KM Standard Error of Mean (logged)			0.119							
2592												
2593	<b>DL/2 Statistics</b>											
2594	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2595		Mean in Original Scale			1.748					Mean in Log Scale		-0.0246
2596		SD in Original Scale			2.362					SD in Log Scale		1.039
2597		95% t UCL (Assumes normality)			2.19					95% H-Stat UCL		2.195

	A	B	C	D	E	F	G	H	I	J	K	L
2598	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2599												
2600	<b>Nonparametric Distribution Free UCL Statistics</b>											
2601	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>											
2602												
2603	<b>Suggested UCL to Use</b>											
2604					KM H-UCL		2.18					
2605												
2606	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2607	Recommendations are based upon data size, data distribution, and skewness.											
2608	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2609	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2610												
2611	<b>Dibenz(a,h)anthracene</b>											
2612												
2613	<b>General Statistics</b>											
2614	Total Number of Observations				38		Number of Distinct Observations				28	
2615	Number of Detects				33		Number of Non-Detects				5	
2616	Number of Distinct Detects				24		Number of Distinct Non-Detects				5	
2617	Minimum Detect				0.094		Minimum Non-Detect				0.43	
2618	Maximum Detect				1.9		Maximum Non-Detect				2.3	
2619	Variance Detects				0.229		Percent Non-Detects				13.16%	
2620	Mean Detects				0.495		SD Detects				0.478	
2621	Median Detects				0.27		CV Detects				0.966	
2622	Skewness Detects				1.599		Kurtosis Detects				1.802	
2623	Mean of Logged Detects				-1.089		SD of Logged Detects				0.873	
2624												
2625	<b>Normal GOF Test on Detects Only</b>											
2626	Shapiro Wilk Test Statistic				0.774		<b>Shapiro Wilk GOF Test</b>					
2627	5% Shapiro Wilk Critical Value				0.931		Detected Data Not Normal at 5% Significance Level					
2628	Lilliefors Test Statistic				0.227		<b>Lilliefors GOF Test</b>					
2629	5% Lilliefors Critical Value				0.152		Detected Data Not Normal at 5% Significance Level					
2630	<b>Detected Data Not Normal at 5% Significance Level</b>											
2631												
2632	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2633	KM Mean				0.471		KM Standard Error of Mean				0.0767	
2634	KM SD				0.455		95% KM (BCA) UCL				0.601	
2635	95% KM (t) UCL				0.6		95% KM (Percentile Bootstrap) UCL				0.596	
2636	95% KM (z) UCL				0.597		95% KM Bootstrap t UCL				0.633	
2637	90% KM Chebyshev UCL				0.701		95% KM Chebyshev UCL				0.805	
2638	97.5% KM Chebyshev UCL				0.95		99% KM Chebyshev UCL				1.234	
2639												
2640	<b>Gamma GOF Tests on Detected Observations Only</b>											
2641	A-D Test Statistic				1.133		<b>Anderson-Darling GOF Test</b>					
2642	5% A-D Critical Value				0.766		Detected Data Not Gamma Distributed at 5% Significance Level					
2643	K-S Test Statistic				0.189		<b>Kolmogorov-Smirnov GOF</b>					
2644	5% K-S Critical Value				0.156		Detected Data Not Gamma Distributed at 5% Significance Level					
2645	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2646												
2647	<b>Gamma Statistics on Detected Data Only</b>											
2648	k hat (MLE)				1.437		k star (bias corrected MLE)				1.327	
2649	Theta hat (MLE)				0.345		Theta star (bias corrected MLE)				0.373	
2650	nu hat (MLE)				94.85		nu star (bias corrected)				87.56	

	A	B	C	D	E	F	G	H	I	J	K	L
2651	Mean (detects)					0.495						
2652												
2653	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2654	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2655	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2656	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2657	This is especially true when the sample size is small.											
2658	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2659	Minimum					0.094	Mean					0.465
2660	Maximum					1.9	Median					0.27
2661	SD					0.453	CV					0.973
2662	k hat (MLE)					1.537	k star (bias corrected MLE)					1.433
2663	Theta hat (MLE)					0.303	Theta star (bias corrected MLE)					0.324
2664	nu hat (MLE)					116.8	nu star (bias corrected)					108.9
2665	Adjusted Level of Significance ( $\beta$ )					0.0434						
2666	Approximate Chi Square Value (108.90, $\alpha$ )					85.81	Adjusted Chi Square Value (108.90, $\beta$ )					84.96
2667	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.59	95% Gamma Adjusted UCL (use when $n < 50$ )					0.596
2668												
2669	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2670	Mean (KM)					0.471	SD (KM)					0.455
2671	Variance (KM)					0.207	SE of Mean (KM)					0.0767
2672	k hat (KM)					1.071	k star (KM)					1.004
2673	nu hat (KM)					81.43	nu star (KM)					76.33
2674	theta hat (KM)					0.44	theta star (KM)					0.469
2675	80% gamma percentile (KM)					0.758	90% gamma percentile (KM)					1.083
2676	95% gamma percentile (KM)					1.409	99% gamma percentile (KM)					2.164
2677												
2678	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2679	Approximate Chi Square Value (76.33, $\alpha$ )					57.21	Adjusted Chi Square Value (76.33, $\beta$ )					56.52
2680	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.628	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.636
2681												
2682	<b>Lognormal GOF Test on Detected Observations Only</b>											
2683	Shapiro Wilk Test Statistic					0.934	<b>Shapiro Wilk GOF Test</b>					
2684	5% Shapiro Wilk Critical Value					0.931	Detected Data appear Lognormal at 5% Significance Level					
2685	Lilliefors Test Statistic					0.145	<b>Lilliefors GOF Test</b>					
2686	5% Lilliefors Critical Value					0.152	Detected Data appear Lognormal at 5% Significance Level					
2687	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2688												
2689	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2690	Mean in Original Scale					0.465	Mean in Log Scale					-1.123
2691	SD in Original Scale					0.452	SD in Log Scale					0.819
2692	95% t UCL (assumes normality of ROS data)					0.588	95% Percentile Bootstrap UCL					0.588
2693	95% BCA Bootstrap UCL					0.612	95% Bootstrap t UCL					0.626
2694	95% H-UCL (Log ROS)					0.612						
2695												
2696	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2697	KM Mean (logged)					-1.134	KM Geo Mean					0.322
2698	KM SD (logged)					0.844	95% Critical H Value (KM-Log)					2.226
2699	KM Standard Error of Mean (logged)					0.145	95% H-UCL (KM -Log)					0.626
2700	KM SD (logged)					0.844	95% Critical H Value (KM-Log)					2.226
2701	KM Standard Error of Mean (logged)					0.145						
2702												
2703	<b>DL/2 Statistics</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
2704	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2705	Mean in Original Scale					0.507	Mean in Log Scale					-1.043
2706	SD in Original Scale					0.463	SD in Log Scale					0.854
2707	95% t UCL (Assumes normality)					0.633	95% H-Stat UCL					0.695
2708	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2709												
2710	<b>Nonparametric Distribution Free UCL Statistics</b>											
2711	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>											
2712												
2713	<b>Suggested UCL to Use</b>											
2714	KM H-UCL					0.626						
2715												
2716	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2717	Recommendations are based upon data size, data distribution, and skewness.											
2718	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2719	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2720												
2721	<b>Hexachlorobenzene</b>											
2722												
2723	<b>General Statistics</b>											
2724	Total Number of Observations					7	Number of Distinct Observations					5
2725	Number of Detects					1	Number of Non-Detects					6
2726	Number of Distinct Detects					1	Number of Distinct Non-Detects					5
2727												
2728	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>											
2729	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>											
2730												
2731	<b>The data set for variable Hexachlorobenzene was not processed!</b>											
2732												
2733												
2734	<b>Indeno(1,2,3-cd)pyrene</b>											
2735												
2736	<b>General Statistics</b>											
2737	Total Number of Observations					68	Number of Distinct Observations					53
2738	Number of Detects					63	Number of Non-Detects					5
2739	Number of Distinct Detects					49	Number of Distinct Non-Detects					5
2740	Minimum Detect					0.079	Minimum Non-Detect					0.43
2741	Maximum Detect					6.3	Maximum Non-Detect					2.3
2742	Variance Detects					1.81	Percent Non-Detects					7.353%
2743	Mean Detects					1.158	SD Detects					1.345
2744	Median Detects					0.61	CV Detects					1.162
2745	Skewness Detects					2.317	Kurtosis Detects					5.155
2746	Mean of Logged Detects					-0.316	SD of Logged Detects					0.937
2747												
2748	<b>Normal GOF Test on Detects Only</b>											
2749	Shapiro Wilk Test Statistic					0.679	<b>Normal GOF Test on Detected Observations Only</b>					
2750	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
2751	Lilliefors Test Statistic					0.279	<b>Lilliefors GOF Test</b>					
2752	5% Lilliefors Critical Value					0.111	Detected Data Not Normal at 5% Significance Level					
2753	<b>Detected Data Not Normal at 5% Significance Level</b>											
2754												
2755	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2756	KM Mean					1.108	KM Standard Error of Mean					0.159

	A	B	C	D	E	F	G	H	I	J	K	L
2757					KM SD	1.3				95% KM (BCA) UCL		1.375
2758					95% KM (t) UCL	1.373				95% KM (Percentile Bootstrap) UCL		1.373
2759					95% KM (z) UCL	1.37				95% KM Bootstrap t UCL		1.457
2760					90% KM Chebyshev UCL	1.585				95% KM Chebyshev UCL		1.802
2761					97.5% KM Chebyshev UCL	2.102				99% KM Chebyshev UCL		2.692
2762												
2763	<b>Gamma GOF Tests on Detected Observations Only</b>											
2764					A-D Test Statistic	2.396				<b>Anderson-Darling GOF Test</b>		
2765					5% A-D Critical Value	0.775			Detected Data Not Gamma Distributed at 5% Significance Level			
2766					K-S Test Statistic	0.18				<b>Kolmogorov-Smirnov GOF</b>		
2767					5% K-S Critical Value	0.115			Detected Data Not Gamma Distributed at 5% Significance Level			
2768	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2769												
2770	<b>Gamma Statistics on Detected Data Only</b>											
2771					k hat (MLE)	1.219				k star (bias corrected MLE)		1.172
2772					Theta hat (MLE)	0.95				Theta star (bias corrected MLE)		0.988
2773					nu hat (MLE)	153.6				nu star (bias corrected)		147.7
2774					Mean (detects)	1.158						
2775												
2776	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2777	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2778	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2779	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2780	This is especially true when the sample size is small.											
2781	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2782					Minimum	0.01				Mean		1.095
2783					Maximum	6.3				Median		0.58
2784					SD	1.315				CV		1.201
2785					k hat (MLE)	1.044				k star (bias corrected MLE)		1.008
2786					Theta hat (MLE)	1.049				Theta star (bias corrected MLE)		1.087
2787					nu hat (MLE)	142				nu star (bias corrected)		137
2788					Adjusted Level of Significance ( $\beta$ )	0.0465						
2789					Approximate Chi Square Value (137.02, $\alpha$ )	111				Adjusted Chi Square Value (137.02, $\beta$ )		110.5
2790					95% Gamma Approximate UCL (use when $n \geq 50$ )	1.352				95% Gamma Adjusted UCL (use when $n < 50$ )		1.359
2791												
2792	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2793					Mean (KM)	1.108				SD (KM)		1.3
2794					Variance (KM)	1.69				SE of Mean (KM)		0.159
2795					k hat (KM)	0.726				k star (KM)		0.704
2796					nu hat (KM)	98.79				nu star (KM)		95.76
2797					theta hat (KM)	1.525				theta star (KM)		1.573
2798					80% gamma percentile (KM)	1.821				90% gamma percentile (KM)		2.777
2799					95% gamma percentile (KM)	3.763				99% gamma percentile (KM)		6.115
2800												
2801	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2802					Approximate Chi Square Value (95.76, $\alpha$ )	74.19				Adjusted Chi Square Value (95.76, $\beta$ )		73.78
2803					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	1.43				95% Gamma Adjusted KM-UCL (use when $n < 50$ )		1.438
2804												
2805	<b>Lognormal GOF Test on Detected Observations Only</b>											
2806					Shapiro Wilk Approximate Test Statistic	0.963				<b>Shapiro Wilk GOF Test</b>		
2807					5% Shapiro Wilk P Value	0.135			Detected Data appear Lognormal at 5% Significance Level			
2808					Lilliefors Test Statistic	0.107				<b>Lilliefors GOF Test</b>		
2809					5% Lilliefors Critical Value	0.111			Detected Data appear Lognormal at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
2810	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2811												
2812	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2813	Mean in Original Scale				1.105		Mean in Log Scale				-0.358	
2814	SD in Original Scale				1.309		SD in Log Scale				0.92	
2815	95% t UCL (assumes normality of ROS data)				1.37		95% Percentile Bootstrap UCL				1.373	
2816	95% BCA Bootstrap UCL				1.415		95% Bootstrap t UCL				1.443	
2817	95% H-UCL (Log ROS)				1.367							
2818												
2819	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2820	KM Mean (logged)				-0.363		KM Geo Mean				0.696	
2821	KM SD (logged)				0.928		95% Critical H Value (KM-Log)				2.213	
2822	KM Standard Error of Mean (logged)				0.115		95% H-UCL (KM -Log)				1.375	
2823	KM SD (logged)				0.928		95% Critical H Value (KM-Log)				2.213	
2824	KM Standard Error of Mean (logged)				0.115							
2825												
2826	<b>DL/2 Statistics</b>											
2827	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2828	Mean in Original Scale				1.116		Mean in Log Scale				-0.347	
2829	SD in Original Scale				1.306		SD in Log Scale				0.926	
2830	95% t UCL (Assumes normality)				1.38		95% H-Stat UCL				1.392	
2831	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2832												
2833	<b>Nonparametric Distribution Free UCL Statistics</b>											
2834	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>											
2835												
2836	<b>Suggested UCL to Use</b>											
2837	KM H-UCL				1.375							
2838												
2839	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2840	Recommendations are based upon data size, data distribution, and skewness.											
2841	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2842	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2843												
2844	<b>Phenanthrene</b>											
2845												
2846	<b>General Statistics</b>											
2847	Total Number of Observations				80		Number of Distinct Observations				63	
2848	Number of Detects				76		Number of Non-Detects				4	
2849	Number of Distinct Detects				61		Number of Distinct Non-Detects				4	
2850	Minimum Detect				0.11		Minimum Non-Detect				0.43	
2851	Maximum Detect				38		Maximum Non-Detect				2.3	
2852	Variance Detects				50.22		Percent Non-Detects				5%	
2853	Mean Detects				3.868		SD Detects				7.087	
2854	Median Detects				1.1		CV Detects				1.832	
2855	Skewness Detects				2.997		Kurtosis Detects				9.254	
2856	Mean of Logged Detects				0.36		SD of Logged Detects				1.315	
2857												
2858	<b>Normal GOF Test on Detects Only</b>											
2859	Shapiro Wilk Test Statistic				0.55		<b>Normal GOF Test on Detected Observations Only</b>					
2860	5% Shapiro Wilk P Value				0		Detected Data Not Normal at 5% Significance Level					
2861	Lilliefors Test Statistic				0.323		<b>Lilliefors GOF Test</b>					
2862	5% Lilliefors Critical Value				0.102		Detected Data Not Normal at 5% Significance Level					



	A	B	C	D	E	F	G	H	I	J	K	L	
2863	<b>Detected Data Not Normal at 5% Significance Level</b>												
2864													
2865	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
2866	KM Mean				3.701	KM Standard Error of Mean				0.777			
2867	KM SD				6.901	95% KM (BCA) UCL				5.163			
2868	95% KM (t) UCL				4.993	95% KM (Percentile Bootstrap) UCL				5.017			
2869	95% KM (z) UCL				4.978	95% KM Bootstrap t UCL				5.476			
2870	90% KM Chebyshev UCL				6.031	95% KM Chebyshev UCL				7.086			
2871	97.5% KM Chebyshev UCL				8.551	99% KM Chebyshev UCL				11.43			
2872													
2873	<b>Gamma GOF Tests on Detected Observations Only</b>												
2874	A-D Test Statistic				4.854	<b>Anderson-Darling GOF Test</b>							
2875	5% A-D Critical Value				0.806	Detected Data Not Gamma Distributed at 5% Significance Level							
2876	K-S Test Statistic				0.208	<b>Kolmogorov-Smirnov GOF</b>							
2877	5% K-S Critical Value				0.107	Detected Data Not Gamma Distributed at 5% Significance Level							
2878	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>												
2879													
2880	<b>Gamma Statistics on Detected Data Only</b>												
2881	k hat (MLE)				0.619	k star (bias corrected MLE)				0.604			
2882	Theta hat (MLE)				6.245	Theta star (bias corrected MLE)				6.407			
2883	nu hat (MLE)				94.13	nu star (bias corrected)				91.75			
2884	Mean (detects)				3.868								
2885													
2886	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
2887	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2888	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
2889	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
2890	This is especially true when the sample size is small.												
2891	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
2892	Minimum				0.01	Mean				3.675			
2893	Maximum				38	Median				1.1			
2894	SD				6.957	CV				1.893			
2895	k hat (MLE)				0.529	k star (bias corrected MLE)				0.518			
2896	Theta hat (MLE)				6.945	Theta star (bias corrected MLE)				7.1			
2897	nu hat (MLE)				84.65	nu star (bias corrected)				82.81			
2898	Adjusted Level of Significance ( $\beta$ )				0.047								
2899	Approximate Chi Square Value (82.81, $\alpha$ )				62.84	Adjusted Chi Square Value (82.81, $\beta$ )				62.52			
2900	95% Gamma Approximate UCL (use when $n \geq 50$ )				4.843	95% Gamma Adjusted UCL (use when $n < 50$ )				4.867			
2901													
2902	<b>Estimates of Gamma Parameters using KM Estimates</b>												
2903	Mean (KM)				3.701	SD (KM)				6.901			
2904	Variance (KM)				47.62	SE of Mean (KM)				0.777			
2905	k hat (KM)				0.288	k star (KM)				0.285			
2906	nu hat (KM)				46.01	nu star (KM)				45.62			
2907	theta hat (KM)				12.87	theta star (KM)				12.98			
2908	80% gamma percentile (KM)				5.601	90% gamma percentile (KM)				10.98			
2909	95% gamma percentile (KM)				17.2	99% gamma percentile (KM)				33.49			
2910													
2911	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
2912	Approximate Chi Square Value (45.62, $\alpha$ )				31.12	Adjusted Chi Square Value (45.62, $\beta$ )				30.91			
2913	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				5.424	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				5.462			
2914													
2915	<b>Lognormal GOF Test on Detected Observations Only</b>												

	A	B	C	D	E	F	G	H	I	J	K	L
2916	Shapiro Wilk Approximate Test Statistic					0.941	Shapiro Wilk GOF Test					
2917	5% Shapiro Wilk P Value					0.00253	Detected Data Not Lognormal at 5% Significance Level					
2918	Lilliefors Test Statistic					0.106	Lilliefors GOF Test					
2919	5% Lilliefors Critical Value					0.102	Detected Data Not Lognormal at 5% Significance Level					
2920	Detected Data Not Lognormal at 5% Significance Level											
2921												
2922	Lognormal ROS Statistics Using Imputed Non-Detects											
2923	Mean in Original Scale					3.699	Mean in Log Scale					0.298
2924	SD in Original Scale					6.945	SD in Log Scale					1.316
2925	95% t UCL (assumes normality of ROS data)					4.991	95% Percentile Bootstrap UCL					5.033
2926	95% BCA Bootstrap UCL					5.214	95% Bootstrap t UCL					5.428
2927	95% H-UCL (Log ROS)					4.707						
2928												
2929	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2930	KM Mean (logged)					0.299	KM Geo Mean					1.348
2931	KM SD (logged)					1.309	95% Critical H Value (KM-Log)					2.594
2932	KM Standard Error of Mean (logged)					0.148	95% H-UCL (KM -Log)					4.653
2933	KM SD (logged)					1.309	95% Critical H Value (KM-Log)					2.594
2934	KM Standard Error of Mean (logged)					0.148						
2935												
2936	DL/2 Statistics											
2937	DL/2 Normal					DL/2 Log-Transformed						
2938	Mean in Original Scale					3.703	Mean in Log Scale					0.302
2939	SD in Original Scale					6.943	SD in Log Scale					1.316
2940	95% t UCL (Assumes normality)					4.995	95% H-Stat UCL					4.727
2941	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2942												
2943	Nonparametric Distribution Free UCL Statistics											
2944	Data do not follow a Discernible Distribution at 5% Significance Level											
2945												
2946	Suggested UCL to Use											
2947	95% KM (Chebyshev) UCL					7.086						
2948												
2949	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2950	Recommendations are based upon data size, data distribution, and skewness.											
2951	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2952	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2953												

***Appendix B-2 Area C – Cottonwood Copse AOC***

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on U <sub>m</sub> /U <sub>c</sub> ) unitless	0.194	0.194
n (total soil porosity) L <sub>poro</sub> /L <sub>soil</sub>	0.43396	0.43396
p <sub>b</sub> (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
p <sub>b</sub> (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
p <sub>c</sub> (soil particle density) g/cm <sup>3</sup>	2.65	2.65
Q/C <sub>wind</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
Q/C <sub>soil</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
Q/C <sub>veg</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
A <sub>c</sub> (PEF acres)	0.5	0.5
A <sub>c</sub> (VF acres)	0.5	0.5
A <sub>c</sub> (VF mass-limit acres)	0.5	0.5
AF <sub>hand</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
AF <sub>face</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
AF <sub>neck</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
AF <sub>leg</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
AF <sub>rec-a</sub> (skin adherence factor - adult) mg/cm <sup>2</sup>	0.07	0.07
AF <sub>rec-c</sub> (skin adherence factor - child) mg/cm <sup>2</sup>	0.2	0.2

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
AT <sub>rec</sub> (averaging time)	365	365
BW <sub>n,r</sub> (body weight) kg	15	15
BW <sub>γ,r</sub> (body weight) kg	15	15
BW <sub>6-16</sub> (body weight) kg	80	80
BW <sub>16-20</sub> (body weight) kg	80	80
BW <sub>rec,a</sub> (body weight - adult) kg	80	80
BW <sub>rec,c</sub> (body weight - child) kg	15	15
DFS <sub>rec,arti</sub> (age-adjusted soil dermal factor) mg/kg	.	27767.6
DFS <sub>M,rec,arti</sub> (mutagenic age-adjusted soil dermal factor) mg/kg	.	115018.4
ED <sub>rec</sub> (exposure duration - recreator) years	26	26
ED <sub>n,r</sub> (exposure duration) year	2	2
ED <sub>γ,r</sub> (exposure duration) year	4	4
ED <sub>6-16</sub> (exposure duration) year	10	10
ED <sub>16-20</sub> (exposure duration) year	10	10
ED <sub>rec,c</sub> (exposure duration - child) years	6	6
EF <sub>rec</sub> (exposure frequency) days/year	.	94
EF <sub>n,r</sub> (exposure frequency) days/year	.	94
EF <sub>γ,r</sub> (exposure frequency) days/year	.	94
EF <sub>6-16</sub> (exposure frequency) days/year	.	94
EF <sub>16-20</sub> (exposure frequency) days/year	.	94
EF <sub>rec,a</sub> (exposure frequency - adult) days/year	.	94
EF <sub>rec,c</sub> (exposure frequency - child) days/year	.	94
ET <sub>rec</sub> (exposure time - recreator) hours/day	.	3
ET <sub>n,r</sub> (exposure time) hours/day	.	3
ET <sub>γ,r</sub> (exposure time) hours/day	.	3
ET <sub>6-16</sub> (exposure time) hours/day	.	3
ET <sub>16-20</sub> (exposure time) hours/day	.	3
ET <sub>rec,a</sub> (adult exposure time) hours/day	.	3
ET <sub>rec,c</sub> (child exposure time) hours/day	.	3
THQ (target hazard quotient) unitless	0.1	0.1

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
IFS <sub>recre-adi</sub> (age-adjusted soil ingestion factor) mg/kg	.	9870
IFSM <sub>recre-adi</sub> (mutagenic age-adjusted soil ingestion factor) mg/kg	.	44806.667
IRS <sub>n,s</sub> (soil intake rate) mg/day	200	200
IRS <sub>γ,s</sub> (soil intake rate) mg/day	200	200
IRS <sub>α,1,s</sub> (soil intake rate) mg/day	100	100
IRS <sub>1,6,30</sub> (soil intake rate) mg/day	100	100
IRS <sub>recre-a</sub> (soil intake rate - adult) mg/day	100	100
IRS <sub>recre-r</sub> (soil intake rate - child) mg/day	200	200
LT (lifetime - recreator) years	70	70
SA <sub>n,s</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>γ,s</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>α,1,s</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>1,6,30</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>recre-a</sub> (skin surface area - adult) cm <sup>2</sup> /day	6032	6032
SA <sub>recre-r</sub> (skin surface area - child) cm <sup>2</sup> /day	2373	2373
TR (target risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>soil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>soil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

# Site-specific

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-	
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-	
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-	
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-	
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-	
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-	
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-	
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-	
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-	

## Site-specific

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GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref
1	-	1	-	-	-	1.50E+03	-	-		2792.15	CRC89
0.15	-	1	-	-	-	4.50E+01	-	-		1908.15	PHYSPROP
1	0.14	1	-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI
1	0.03	0.6	-	-	-	2.90E+01	-	-		888.15	PHYSPROP
0.07	-	1	-	-	-	4.10E+01	-	-		1873.15	PHYSPROP
1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP
1	0.13	1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP
1	0.13	1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI
1	0.13	1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP
0.025	0.001	1	-	-	-	7.50E+01	-	-		1038.15	PHYSPROP
0.013	-	1	-	-	-	1.80E+06	-	-		-	
1	0.13	1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP
1	-	1	-	-	-	4.50E+01	-	-		3200.15	CRC89
1	-	1	-	-	-	3.50E+01	-	-		2868.15	PHYSPROP
1	0.13	1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP
1	0.13	1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP
0.04	-	1	-	-	-	6.50E+01	-	-		2368.15	PHYSPROP
1	-	1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP
1	-	1	-	5.47E+04	-	-	-	-		-	
1	-	1	-	-	-	6.20E+01	-	-		1181.15	PHYSPROP



# Site-specific Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia} \backslash$ (cm <sup>2</sup> /s)	$D_{iw} \backslash$ (cm <sup>2</sup> /s)	$D_A \backslash$ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)
6700	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
5070	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09	1.36E+09	1.31E+06	1.29E+00	3.29E+00	1.92E+02
1673	CRC89	INORGANIC	-	-	-	1.36E+09	-	2.88E+00	2.04E+01	2.64E+04
3572.13	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09	4.41E+06	5.70E+00	1.71E+01	2.21E+03
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E+01	1.71E+02	6.84E+06
2291	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	6.32E+04
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	-	1.36E+09	-	5.70E+02	1.71E+03	6.84E+07
7398.48	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	1.26E+04
5123	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
-		PAH	4.46E-02	5.21E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
-		PAH	4.48E-02	5.23E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
4325	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-
3170	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-

# Site-specific

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Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL Child THQ=0.1 (mg/kg)	Dermal SL Child THQ=0.1 (mg/kg)	Inhalation SL Child THQ=0.1 (mg/kg)	Noncarcinogenic SL Child THI=0.1 (mg/kg)	Ingestion SL Adult THQ=0.1 (mg/kg)	Dermal SL Adult THQ=0.1 (mg/kg)	Inhalation SL Adult THQ=0.1 (mg/kg)	Noncarcinogenic SL Adult THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	2.91E+04	-	2.11E+07	2.91E+04	3.11E+05	-	2.11E+07	3.06E+05	2.91E+04 nc
-	1.16E+01	-	-	1.16E+01	1.24E+02	-	-	1.24E+02	1.16E+01 nc
9.24E-01	-	-	-	-	-	-	-	-	9.24E-01 ca
2.52E+00	1.46E+01	1.23E+02	6.33E+04	1.30E+01	1.55E+02	7.36E+02	6.33E+04	1.28E+02	2.52E+00 ca**
-	5.82E+03	-	2.11E+06	5.81E+03	6.21E+04	-	2.11E+06	6.04E+04	5.81E+03 nc
4.27E+00	-	-	-	-	-	-	-	-	4.27E+00 ca
4.28E-01	8.74E+00	2.83E+01	8.45E+03	6.67E+00	9.32E+01	1.70E+02	8.45E+03	5.97E+01	4.28E-01 ca*
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca
4.28E+01	-	-	-	-	-	-	-	-	4.28E+01 ca
6.32E+04	2.91E+01	3.07E+02	4.22E+04	2.66E+01	3.11E+02	1.84E+03	4.22E+04	2.64E+02	2.66E+01 nc
-	4.37E+04	-	-	4.37E+04	4.66E+05	-	-	4.66E+05	4.37E+04 nc
4.28E+02	-	-	-	-	-	-	-	-	4.28E+02 ca
1.26E+04	8.74E+00	-	2.53E+04	8.73E+00	9.32E+01	-	2.53E+04	9.28E+01	8.73E+00 nc
-	1.16E+03	-	-	1.16E+03	1.24E+04	-	-	1.24E+04	1.16E+03 nc
4.28E-01	-	-	-	-	-	-	-	-	4.28E-01 ca
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca
-	6.99E+02	-	2.11E+05	6.97E+02	7.46E+03	-	2.11E+05	7.20E+03	6.97E+02 nc
-	-	-	3.23E+01	3.23E+01	-	-	3.23E+01	3.23E+01	3.23E+01 sat
-	5.82E-01	-	-	5.82E-01	6.21E+00	-	-	6.21E+00	5.82E-01 nc
-	8.74E+03	-	-	8.74E+03	9.32E+04	-	-	9.32E+04	8.74E+03 nc

# Site-specific Recreator Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.44E-02
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04
Zinc and Compounds	-	-	-	-	3.00E-01	I	-	-	1	-	1	-	-
<i>*Total Risk/HL</i>	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Recreator Risk for Soil

Chemical	$K_{oc}$ ( $cm^3/g$ )	$K_d$ ( $cm^3/g$ )	HLC ( $atm \cdot m^3/mole$ )	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref
Aluminum	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89
Antimony (metallic)	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS
Aroclor 1260	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil
Arsenic, Inorganic	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89
Barium	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS
Benz[a]anthracene	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS
Benzo[a]pyrene	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-	
Benzo[b]fluoranthene	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-	
Benzo[k]fluoranthene	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-	
Cadmium (Diet)	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS
Chromium(III), Insoluble Salts	-	1.80E+06	-	-		-		-	
Chrysene	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS
Cobalt	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS
Copper	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS
Dibenz[a,h]anthracene	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-	
Indeno[1,2,3-cd]pyrene	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-	
Manganese (Non-diet)	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89
Mercury (elemental)	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89
Thallium Sulfate	-	-	-	-		-		-	
Zinc and Compounds	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS
<i>*Total Risk/HL</i>	-	-	-	-		-		-	

# Site-specific Recreator Risk for Soil

Chemical	Chemical Type	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk
Aluminum	INORGANIC	-	-	-	1.36E+09	-	1.12E+04	-	-	-
Antimony (metallic)	INORGANIC	-	-	-	1.36E+09	-	7.59E+00	-	-	-
Aroclor 1260	PCB	2.20E-02	5.61E-06	7.70E-09	1.36E+09	1.31E+06	1.67E+00	1.29E-06	5.08E-07	8.69E-09
Arsenic, Inorganic	INORGANIC	-	-	-	1.36E+09	-	3.85E+00	1.34E-06	1.88E-07	1.46E-10
Barium	INORGANIC	-	-	-	1.36E+09	-	1.47E+02	-	-	-
Benz[a]anthracene	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09	4.41E+06	7.67E-01	1.35E-07	4.49E-08	3.47E-10
Benzo[a]pyrene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	3.51E-01	6.16E-07	2.05E-07	5.13E-12
Benzo[b]fluoranthene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	7.50E-01	1.32E-07	4.39E-08	1.10E-12
Benzo[k]fluoranthene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.38E-01	9.43E-09	3.15E-09	7.86E-14
Cadmium (Diet)	INORGANIC	-	-	-	1.36E+09	-	1.35E+00	-	-	2.14E-11
Chromium(III), Insoluble Salts	INORGANIC	-	-	-	1.36E+09	-	9.35E+01	-	-	-
Chrysene	PAH	2.61E-02	6.75E-06	-	1.36E+09	-	8.35E-01	1.46E-09	4.89E-10	1.22E-14
Cobalt	INORGANIC	-	-	-	1.36E+09	-	4.88E+00	-	-	3.86E-10
Copper	INORGANIC	-	-	-	1.36E+09	-	8.40E+01	-	-	-
Dibenz[a,h]anthracene	PAH	4.46E-02	5.21E-06	-	1.36E+09	-	3.90E-01	6.84E-07	2.28E-07	5.70E-12
Indeno[1,2,3-cd]pyrene	PAH	4.48E-02	5.23E-06	-	1.36E+09	-	3.01E-01	5.28E-08	1.76E-08	4.40E-13
Manganese (Non-diet)	INORGANIC	-	-	-	1.36E+09	-	8.13E+02	-	-	-
Mercury (elemental)	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09	3.47E+04	3.29E-01	-	-	-
Thallium Sulfate	INORGANIC	-	-	-	1.36E+09	-	1.85E+00	-	-	-
Zinc and Compounds	INORGANIC	-	-	-	1.36E+09	-	1.35E+02	-	-	-
<i>*Total Risk/HI</i>		-	-	-	-	-	-	<i>4.26E-06</i>	<i>1.24E-06</i>	<i>9.60E-09</i>

# Site-specific Recreator Risk for Soil

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Inhalation Child HQ	Noncarcinogenic Child HI	Ingestion Adult HQ	Dermal Adult HQ	Inhalation Adult HQ	Noncarcinogenic Adult HI
Aluminum	-	3.85E-02	-	5.31E-05	3.86E-02	3.61E-03	-	5.31E-05	3.66E-03
Antimony (metallic)	-	6.52E-02	-	-	6.52E-02	6.11E-03	-	-	6.11E-03
Aroclor 1260	1.81E-06	-	-	-	-	-	-	-	-
Arsenic, Inorganic	1.53E-06	2.64E-02	3.14E-03	6.08E-06	2.96E-02	2.48E-03	5.23E-04	6.08E-06	3.01E-03
Barium	-	2.53E-03	-	6.98E-06	2.54E-03	2.37E-04	-	6.98E-06	2.44E-04
Benz[a]anthracene	1.80E-07	-	-	-	-	-	-	-	-
Benzo[a]pyrene	8.21E-07	4.02E-03	1.24E-03	4.16E-06	5.26E-03	3.77E-04	2.07E-04	4.16E-06	5.88E-04
Benzo[b]fluoranthene	1.75E-07	-	-	-	-	-	-	-	-
Benzo[k]fluoranthene	1.26E-08	-	-	-	-	-	-	-	-
Cadmium (Diet)	2.14E-11	4.64E-03	4.40E-04	3.20E-06	5.08E-03	4.35E-04	7.34E-05	3.20E-06	5.11E-04
Chromium(III), Insoluble Salts	-	2.14E-04	-	-	2.14E-04	2.01E-05	-	-	2.01E-05
Chrysene	1.95E-09	-	-	-	-	-	-	-	-
Cobalt	3.86E-10	5.59E-02	-	1.93E-05	5.59E-02	5.24E-03	-	1.93E-05	5.26E-03
Copper	-	7.21E-03	-	-	7.21E-03	6.76E-04	-	-	6.76E-04
Dibenz[a,h]anthracene	9.12E-07	-	-	-	-	-	-	-	-
Indeno[1,2,3-cd]pyrene	7.04E-08	-	-	-	-	-	-	-	-
Manganese (Non-diet)	-	1.16E-01	-	3.85E-04	1.17E-01	1.09E-02	-	3.85E-04	1.13E-02
Mercury (elemental)	-	-	-	1.02E-03	1.02E-03	-	-	1.02E-03	1.02E-03
Thallium Sulfate	-	3.18E-01	-	-	3.18E-01	2.98E-02	-	-	2.98E-02
Zinc and Compounds	-	1.55E-03	-	-	1.55E-03	1.45E-04	-	-	1.45E-04
<b>*Total Risk/HI</b>	<b>5.51E-06</b>	<b>6.40E-01</b>	<b>4.82E-03</b>	<b>1.49E-03</b>	<b>6.46E-01</b>	<b>6.00E-02</b>	<b>8.03E-04</b>	<b>1.49E-03</b>	<b>6.23E-02</b>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{soil}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{veg}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5



## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm·m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-
-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-		PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-		PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-		PAH	4.76E-02
-	-	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC	-
-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02

## Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
5.61E-06	7.70E-09	1.36E+09	1.31E+06	3.30E+00	5.56E+00	5.68E+01	2.00E+00	-	-	-	-	2.00E+00 ca
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	1.87E+04	1.87E+04	2.35E+02	1.39E+03	1.20E+04	1.98E+02	1.98E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca

## Site-specific

### Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>0</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Dichloropropene, cis-1,3-	10061-01-5	No	Yes	Organics	-		-		-		-		1	-	1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-		1	-	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>*</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> (cm <sup>2</sup> /s)
1.21E+03	2.18E+03	7.22E+01	4.33E-01	2.71E-03	1.11E-01	PHYSPROP	377.45	PHYSPROP	577	YAWS	VOC	7.65E-02
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-

## Site-specific

### Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

D <sub>w</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
1.02E-05	8.15E-04	1.36E+09	4.04E+03	-	-	-	-	-	-	-	-	
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc
-	-	1.36E+09	-	-	-	-	-	7.06E+04	-	-	7.06E+04	7.06E+04 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-	4.50E+01
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.44E-02	3.50E+05	2.10E+03
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05	-
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-	-	7.50E+01
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-	3.50E+01
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06	-
Dichloropropene, cis-1,3-	-	-	-	-	-	-	-	-	1	-	1	1.21E+03	2.18E+03	7.22E+01	4.33E-01
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04	-	-
Zinc and Compounds	-	-	-	-	3.00E-01	I	-	-	1	-	1	-	-	-	6.20E+01
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>i</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-
Antimony (metallic)	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-	-	-
Aroclor 1260	3.36E-04	1.37E-02	PHYSROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09
Arsenic, Inorganic	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-	-	-
Barium	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-	-	-
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02	5.56E-06	-
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-
Cadmium (Diet)	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-	-	-
Chromium(III), Insoluble Salts	-	-		-		-		INORGANIC	-	-	-
Chrysene	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	-
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-
Copper	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-	-	-
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02	5.21E-06	-
Dichloropropene, cis-1,3-	2.71E-03	1.11E-01	PHYSROP	377.45	PHYSROP	577	YAWS	VOC	7.65E-02	1.02E-05	8.15E-04
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-		PAH	4.48E-02	5.23E-06	-
Manganese (Non-diet)	-	-		2368.15	PHYSROP	4325	CRC89	INORGANIC	-	-	-
Mercury (elemental)	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05
Thallium Sulfate	-	-		-		-		INORGANIC	-	-	-
Zinc and Compounds	-	-		1181.15	PHYSROP	3170	YAWS	INORGANIC	-	-	-
<i>*Total Risk/HI</i>	-	-		-		-			-	-	-



# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m³/kg)	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	1.36E+09	-	1.12E+04	-	-	-	-	4.76E-03	-	1.87E-04	4.95E-03
Antimony (metallic)	1.36E+09	-	7.59E+00	-	-	-	-	8.06E-03	-	-	8.06E-03
Aroclor 1260	1.36E+09	1.31E+06	1.67E+00	5.07E-07	3.00E-07	2.94E-08	8.36E-07	-	-	-	-
Arsenic, Inorganic	1.36E+09	-	3.85E+00	5.26E-07	1.11E-07	4.93E-10	6.37E-07	3.27E-03	6.92E-04	2.14E-05	3.98E-03
Barium	1.36E+09	-	1.47E+02	-	-	-	-	3.13E-04	-	2.46E-05	3.38E-04
Benz[a]anthracene	1.36E+09	4.41E+06	7.67E-01	1.16E-08	6.40E-09	4.23E-10	1.85E-08	-	-	-	-
Benzo[a]pyrene	1.36E+09	-	3.51E-01	5.32E-08	2.93E-08	6.27E-12	8.25E-08	4.97E-04	2.73E-04	1.46E-05	7.85E-04
Benzo[b]fluoranthene	1.36E+09	-	7.50E-01	1.14E-08	6.26E-09	1.34E-12	1.76E-08	-	-	-	-
Benzo[k]fluoranthene	1.36E+09	-	5.38E-01	8.16E-10	4.49E-10	9.60E-14	1.26E-09	-	-	-	-
Cadmium (Diet)	1.36E+09	-	1.35E+00	-	-	7.23E-11	7.23E-11	5.73E-04	9.71E-05	1.12E-05	6.82E-04
Chromium(III), Insoluble Salts	1.36E+09	-	9.35E+01	-	-	-	-	2.65E-05	-	-	2.65E-05
Chrysene	1.36E+09	-	8.35E-01	1.27E-10	6.97E-11	1.49E-14	1.96E-10	-	-	-	-
Cobalt	1.36E+09	-	4.88E+00	-	-	1.31E-09	1.31E-09	6.91E-03	-	6.78E-05	6.98E-03
Copper	1.36E+09	-	8.40E+01	-	-	-	-	8.92E-04	-	-	8.92E-04
Dibenz[a,h]anthracene	1.36E+09	-	3.90E-01	5.91E-08	3.25E-08	6.96E-12	9.17E-08	-	-	-	-
Dichloropropene, cis-1,3-	1.36E+09	4.04E+03	-	-	-	-	-	-	-	-	-
Indeno[1,2,3-cd]pyrene	1.36E+09	-	3.01E-01	4.57E-09	2.51E-09	5.37E-13	7.08E-09	-	-	-	-
Manganese (Non-diet)	1.36E+09	-	8.13E+02	-	-	-	-	1.44E-02	-	1.35E-03	1.57E-02
Mercury (elemental)	1.36E+09	3.47E+04	3.29E-01	-	-	-	-	-	-	3.58E-03	3.58E-03
Thallium Sulfate	1.36E+09	-	1.85E+00	-	-	-	-	3.93E-02	-	-	3.93E-02
Zinc and Compounds	1.36E+09	-	1.35E+02	-	-	-	-	1.91E-04	-	-	1.91E-04
<i>*Total Risk/HI</i>	-	-	-	<i>1.17E-06</i>	<i>4.89E-07</i>	<i>3.17E-08</i>	<i>1.69E-06</i>	<i>7.92E-02</i>	<i>1.06E-03</i>	<i>5.26E-03</i>	<i>8.55E-02</i>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{soil}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{veg}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm·m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-
-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02
-	-	-	2.90E+01	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02
-	-	-	7.50E+01	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-
-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02

## Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
5.61E-06	7.70E-09	1.36E+09	1.31E+06	3.30E+00	5.56E+00	5.68E+01	2.00E+00	-	-	-	-	2.00E+00 ca
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	1.87E+04	1.87E+04	2.35E+02	1.39E+03	1.20E+04	1.98E+02	1.98E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Nitroso-di-N-propylamine, N-	621-64-7	No	No	Organics	7.00E+00	I	2.00E-03	C	-		-		1	0.1	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-		1	-	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>*</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	1.30E+04	2.75E+02	-	5.38E-06	2.20E-04	PHYSPROP	479.15	PHYSPROP	-		SVOC	5.64E-02
-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-



## Site-specific

### Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_w \backslash$ ( $\text{cm}^2/\text{s}$ )	$D_A \backslash$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
7.76E-06	-	1.36E+09	-	9.42E-01	2.23E+00	1.68E+04	6.62E-01	-	-	-	-	6.62E-01 ca
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc
-	-	1.36E+09	-	-	-	-	-	7.06E+04	-	-	7.06E+04	7.06E+04 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aluminum	-		-		1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-		-		4.00E-04	I	-		0.15	-	1	-	-	-	4.50E+01
Aroclor 1260	2.00E+00	S	5.71E-04	S	-		-		1	0.14	1	-	1.44E-02	3.50E+05	2.10E+03
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1	-	8.00E-04	5.87E+05	-
Cadmium (Diet)	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-	-	7.50E+01
Chromium(III), Insoluble Salts	-		-		1.50E+00	I	-		0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-		-		4.00E-02	H	-		1	-	1	-	-	-	3.50E+01
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1	-	2.49E-03	1.91E+06	-
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01
Mercury (elemental)	-		-		-		3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Nitroso-di-N-propylamine, N-	7.00E+00	I	2.00E-03	C	-		-		1	0.1	1	-	1.30E+04	2.75E+02	-
Thallium Sulfate	-		-		2.00E-05	X	-		1	-	1	-	5.47E+04	-	-
Zinc and Compounds	-		-		3.00E-01	I	-		1	-	1	-	-	-	6.20E+01
<i>*Total Risk/HI</i>	-		-		-		-		-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)	D <sub>10</sub> (cm <sup>2</sup> /s)	D <sub>10</sub> (cm <sup>2</sup> /s)
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-
Antimony (metallic)	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-	-	-
Aroclor 1260	3.36E-04	1.37E-02	PHYSROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09
Arsenic, Inorganic	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-	-	-
Barium	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-	-	-
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-	-	PAH	4.76E-02	5.56E-06	-
Cadmium (Diet)	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-	-	-
Chromium(III), Insoluble Salts	-	-		-	-	-	-	INORGANIC	-	-	-
Chrysene	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	-
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-
Copper	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-	-	-
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-	-	PAH	4.46E-02	5.21E-06	-
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-	-	PAH	4.48E-02	5.23E-06	-
Manganese (Non-diet)	-	-		2368.15	PHYSROP	4325	CRC89	INORGANIC	-	-	-
Mercury (elemental)	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05
Nitroso-di-N-propylamine, N-	5.38E-06	2.20E-04	PHYSROP	479.15	PHYSROP	-	-	SVOC	5.64E-02	7.76E-06	-
Thallium Sulfate	-	-		-	-	-	-	INORGANIC	-	-	-
Zinc and Compounds	-	-		1181.15	PHYSROP	3170	YAWS	INORGANIC	-	-	-
<i>*Total Risk/HI</i>	-	-		-		-			-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m³/kg)	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	1.36E+09	-	1.02E+04	-	-	-	-	4.33E-03	-	1.70E-04	4.50E-03
Antimony (metallic)	1.36E+09	-	6.79E+00	-	-	-	-	7.21E-03	-	-	7.21E-03
Aroclor 1260	1.36E+09	1.31E+06	1.67E+00	5.07E-07	3.00E-07	2.94E-08	8.36E-07	-	-	-	-
Arsenic, Inorganic	1.36E+09	-	3.64E+00	4.97E-07	1.05E-07	4.66E-10	6.02E-07	3.09E-03	6.54E-04	2.02E-05	3.77E-03
Barium	1.36E+09	-	9.48E+01	-	-	-	-	2.01E-04	-	1.58E-05	2.17E-04
Benz[a]anthracene	1.36E+09	4.41E+06	4.94E-01	7.49E-09	4.12E-09	2.73E-10	1.19E-08	-	-	-	-
Benzo[a]pyrene	1.36E+09	-	2.89E-01	4.38E-08	2.41E-08	5.16E-12	6.80E-08	4.09E-04	2.25E-04	1.20E-05	6.46E-04
Benzo[b]fluoranthene	1.36E+09	-	5.02E-01	7.61E-09	4.19E-09	8.96E-13	1.18E-08	-	-	-	-
Benzo[k]fluoranthene	1.36E+09	-	3.99E-01	6.05E-10	3.33E-10	7.12E-14	9.38E-10	-	-	-	-
Cadmium (Diet)	1.36E+09	-	8.00E-01	-	-	4.28E-11	4.28E-11	3.40E-04	5.75E-05	6.66E-06	4.04E-04
Chromium(III), Insoluble Salts	1.36E+09	-	5.58E+01	-	-	-	-	1.58E-05	-	-	1.58E-05
Chrysene	1.36E+09	-	5.48E-01	8.31E-11	4.57E-11	9.78E-15	1.29E-10	-	-	-	-
Cobalt	1.36E+09	-	1.24E+01	-	-	3.31E-09	3.31E-09	1.75E-02	-	1.72E-04	1.77E-02
Copper	1.36E+09	-	1.12E+02	-	-	-	-	1.18E-03	-	-	1.18E-03
Dibenz[a,h]anthracene	1.36E+09	-	1.70E-01	2.58E-08	1.42E-08	3.03E-12	4.00E-08	-	-	-	-
Indeno[1,2,3-cd]pyrene	1.36E+09	-	2.33E-01	3.53E-09	1.94E-09	4.16E-13	5.48E-09	-	-	-	-
Manganese (Non-diet)	1.36E+09	-	7.83E+02	-	-	-	-	1.39E-02	-	1.30E-03	1.52E-02
Mercury (elemental)	1.36E+09	3.47E+04	2.23E-01	-	-	-	-	-	-	2.43E-03	2.43E-03
Nitroso-di-N-propylamine, N-	1.36E+09	-	3.40E-01	3.61E-07	1.53E-07	2.02E-11	5.14E-07	-	-	-	-
Thallium Sulfate	1.36E+09	-	1.55E+00	-	-	-	-	3.29E-02	-	-	3.29E-02
Zinc and Compounds	1.36E+09	-	1.11E+02	-	-	-	-	1.57E-04	-	-	1.57E-04
<b>*Total Risk/HI</b>	-	-	-	<b>1.45E-06</b>	<b>6.07E-07</b>	<b>3.35E-08</b>	<b>2.09E-06</b>	<b>8.12E-02</b>	<b>9.37E-04</b>	<b>4.13E-03</b>	<b>8.63E-02</b>

# Site-specific Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
A (PEF Dispersion Constant)	2.4538	2.4538
$A_{site}$ (areal extent of site) $m^2$	2023.43	2023.43
B (PEF Dispersion Constant)	17.5660	17.5660
C (PEF Dispersion Constant)	189.0426	189.0426
$F_n$ Unitless Dispersion Correction Factor	0.185837208	0.185837208
F(x) (function dependant on $U_{min}/U_0$ , derived using Cowherd et al. (1985))	0.194	0.194
$M_{moist}$ (Gravimetric soil moisture content) %	7.9	7.9
$M_{moist,av}$ (Gravimetric soil moisture content) %	12	12
$M_{wind}$ (dust emitted by wind erosion) g	51288.84717	51288.84717
$N_{dump}$ (number of times soil is dumped)	2	2
$N_{till}$ (number of times soil is tilled)	2	2
$Q/C_{ca}$ (inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source) g/m <sup>2</sup> -s per kg/m <sup>3</sup>	14.31407	14.31407
$\rho_{soil}$ (density) g/cm <sup>3</sup> - chemical-specific	1.68	1.68
$s_{soil}$ (soil silt content) %	6.9	6.9
$AF_{cw}$ (skin adherence factor - construction worker) mg/cm <sup>2</sup>	0.3	0.3
$AT_{cw}$ (averaging time - construction worker) days	365	365
$BW_{cw}$ (body weight - construction worker) kg	80	80
$ED_{cw}$ (exposure duration - construction worker) yr	1	1
$EF_{cw}$ (exposure frequency - construction worker) day/yr	250	250
$ET_{cw}$ (exposure time - construction worker) hr/day	8	8
THQ (target hazard quotient) unitless	0.1	0.1
$IRS_{cw}$ (soil ingestion rate - construction worker) mg/day	330	330
LT (lifetime) yr	70	70
$SA_{cw}$ (surface area - construction worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
$S_{doz}$ (dozing speed) kph	11.4	11.4
$S_{grade}$ (grading speed) kph	11.4	11.4
$s_{soil}$ (soil silt content) %	18	18
$t_c$ (overall duration of construction) hours	8400	8400

# Site-specific Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
$T_c$ (overall duration of construction) s	30240000	30240000
T (time over which traffic occurs) s	7200000	7200000
$T_t$ (overall duration of traffic) s	7200000	7200000
$U_m$ (mean annual wind speed) m/s	4.69	4.69
$U_t$ (equivalent threshold value) m/s	11.32	11.32
V (fraction of vegetative cover)	0	0

# Site-specific

## Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	P /Subchronic	-		0.15	-
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I /Chronic	2.00E-06	I /Chronic	1	0.13
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	5.00E-04	A /Subchronic	1.00E-05	A /Chronic	0.025	0.001
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-
Chromium(VI)	18540-29-9	Yes	No	Inorganics	5.00E-01	C	8.40E-02	S	5.00E-03	A /Subchronic	3.00E-04	A /Subchronic	0.025	-
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-

# Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sub>1</sub> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
1	-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
1	-	-	-	4.50E+01	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-
1	-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02
0.6	-	-	-	2.90E+01	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-
1	-	-	-	4.10E+01	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-
1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02
1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02
1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02
1	-	-	-	7.50E+01	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-
1	-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
1	-	1.69E+06	-	1.90E+01	-	-		-		-		INORGANIC	-
1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-



# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	1.36E+09	-	-	-	-	-	3.39E+04	-	2.85E+06	3.35E+04	3.35E+04 nc
-	-	1.36E+09	-	-	-	-	-	1.36E+01	-	-	1.36E+01	1.36E+01 nc
5.61E-06	7.70E-09	1.36E+09	2.85E+05	1.24E+01	2.76E+01	1.53E+02	8.10E+00	-	-	-	-	8.10E+00 ca
-	-	1.36E+09	-	2.75E+01	1.72E+02	9.69E+04	2.37E+01	1.70E+01	1.06E+02	8.56E+03	1.46E+01	1.46E+01 nc
-	-	1.36E+09	-	-	-	-	-	6.79E+03	-	2.85E+06	6.77E+03	6.77E+03 nc
6.75E-06	6.83E-10	1.36E+09	9.57E+05	2.48E+02	5.94E+02	4.89E+03	1.69E+02	-	-	-	-	1.69E+02 ca
5.56E-06	-	1.36E+09	-	2.48E+01	5.94E+01	6.95E+05	1.75E+01	1.02E+01	2.44E+01	1.14E+03	7.14E+00	7.14E+00 nc
5.56E-06	-	1.36E+09	-	2.48E+02	5.94E+02	6.95E+06	1.75E+02	-	-	-	-	1.75E+02 ca
5.56E-06	-	1.36E+09	-	2.48E+03	5.94E+03	6.95E+07	1.75E+03	-	-	-	-	1.75E+03 ca
-	-	1.36E+09	-	-	-	2.32E+05	2.32E+05	1.70E+01	1.32E+02	5.71E+03	1.50E+01	1.50E+01 nc
-	-	1.36E+09	-	-	-	-	-	5.09E+04	-	2.85E+06	5.00E+04	5.00E+04 nc
-	-	1.36E+09	-	4.96E+01	-	4.96E+03	4.91E+01	1.70E+02	-	1.71E+05	1.70E+02	4.91E+01 ca**
6.75E-06	-	1.36E+09	-	2.48E+04	5.94E+04	6.95E+08	1.75E+04	-	-	-	-	1.75E+04 ca
-	-	1.36E+09	-	-	-	4.63E+04	4.63E+04	1.02E+02	-	1.14E+04	1.01E+02	1.01E+02 nc

# Site-specific

## Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Copper	7440-50-8	No	No	Inorganics	-		-		1.00E-02	A /Subchronic	-		1	-
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S /Chronic	5.00E-05	I /Chronic	0.04	-
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	H /Subchronic	1	-
Nitroso-di-N-propylamine, N-	621-64-7	No	No	Organics	7.00E+00	I	2.00E-03	C	-		-		1	0.1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		5.00E-05	X /Subchronic	-		1	-
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	A /Subchronic	-		1	-

# Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> (cm <sup>2</sup> /s)
1	-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-
1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
1	-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
1	-	1.30E+04	2.75E+02	-	5.38E-06	2.20E-04	PHYSPROP	479.15	PHYSPROP	-		SVOC	5.64E-02
1	-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
1	-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

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$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	1.36E+09	-	-	-	-	-	3.39E+02	-	-	3.39E+02	3.39E+02 nc
5.21E-06	-	1.36E+09	-	2.48E+01	5.94E+01	6.95E+05	1.75E+01	-	-	-	-	1.75E+01 ca
5.23E-06	-	1.36E+09	-	2.48E+02	5.94E+02	6.95E+06	1.75E+02	-	-	-	-	1.75E+02 ca
-	-	1.36E+09	-	-	-	-	-	8.15E+02	-	2.85E+04	7.92E+02	7.92E+02 nc
6.30E-06	1.10E-05	1.36E+09	7.53E+03	-	-	-	-	-	-	9.49E-01	9.49E-01	9.49E-01 nc
7.76E-06	-	1.36E+09	-	3.54E+00	1.10E+01	2.08E+05	2.68E+00	-	-	-	-	2.68E+00 ca
-	-	1.36E+09	-	-	-	-	-	1.70E+00	-	-	1.70E+00	1.70E+00 nc
-	-	1.36E+09	-	-	-	-	-	1.02E+04	-	-	1.02E+04	1.02E+04 nc

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>0</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)
Aluminum	-	-	-	-	1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-	1	-
Antimony (metallic)	-	-	-	-	4.00E-04	P /Subchronic	-	-	0.15	-	1	-
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I/Chronic	1.50E-05	C /Chronic	1	0.03	0.6	-
Barium	-	-	-	-	2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-	1	-
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I/Chronic	2.00E-06	I/Chronic	1	0.13	1	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-
Cadmium (Diet)	-	-	1.80E-03	I	5.00E-04	A /Subchronic	1.00E-05	A /Chronic	0.025	0.001	1	-
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-	1	-
Chromium(VI)	5.00E-01	C	8.40E-02	S	5.00E-03	A /Subchronic	3.00E-04	A /Subchronic	0.025	-	1	-
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-
Cobalt	-	-	9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-	1	-
Copper	-	-	-	-	1.00E-02	A /Subchronic	-	-	1	-	1	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S /Chronic	5.00E-05	I/Chronic	0.04	-	1	-
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	H /Subchronic	1	-	1	3.13E+00
Nitroso-di-N-propylamine, N-	7.00E+00	I	2.00E-03	C	-	-	-	-	1	0.1	1	-
Thallium Sulfate	-	-	-	-	5.00E-05	X /Subchronic	-	-	1	-	1	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>o</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>o</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref
Aluminum	-	-	1.50E+03	-	-	-	2792.15	CRC89	6700	CRC89
Antimony (metallic)	-	-	4.50E+01	-	-	-	1908.15	PHYSPROP	5070	YAWS
Aroclor 1260	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil
Arsenic, Inorganic	-	-	2.90E+01	-	-	-	888.15	PHYSPROP	1673	CRC89
Barium	-	-	4.10E+01	-	-	-	1873.15	PHYSPROP	3572.13	YAWS
Benz[a]anthracene	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS
Benzo[a]pyrene	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-	-
Benzo[b]fluoranthene	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-	-
Benzo[k]fluoranthene	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-	-
Cadmium (Diet)	-	-	7.50E+01	-	-	-	1038.15	PHYSPROP	2291	YAWS
Chromium(III), Insoluble Salts	-	-	1.80E+06	-	-	-	-	-	-	-
Chromium(VI)	1.69E+06	-	1.90E+01	-	-	-	-	-	-	-
Chrysene	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS
Cobalt	-	-	4.50E+01	-	-	-	3200.15	CRC89	7398.48	YAWS
Copper	-	-	3.50E+01	-	-	-	2868.15	PHYSPROP	5123	YAWS
Dibenz[a,h]anthracene	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-	-
Indeno[1,2,3-cd]pyrene	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-	-
Manganese (Non-diet)	-	-	6.50E+01	-	-	-	2368.15	PHYSPROP	4325	CRC89
Mercury (elemental)	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89
Nitroso-di-N-propylamine, N-	1.30E+04	2.75E+02	-	5.38E-06	2.20E-04	PHYSPROP	479.15	PHYSPROP	-	-
Thallium Sulfate	5.47E+04	-	-	-	-	-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Chemical Type	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk
Aluminum	INORGANIC	-	-	-	1.36E+09	-	1.02E+04	-	-	-
Antimony (metallic)	INORGANIC	-	-	-	1.36E+09	-	6.79E+00	-	-	-
Aroclor 1260	PCB	2.20E-02	5.61E-06	7.70E-09	1.36E+09	2.85E+05	1.67E+00	1.35E-07	6.05E-08	1.09E-08
Arsenic, Inorganic	INORGANIC	-	-	-	1.36E+09	-	3.64E+00	1.32E-07	2.12E-08	3.76E-11
Barium	INORGANIC	-	-	-	1.36E+09	-	9.48E+01	-	-	-
Benz[a]anthracene	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09	9.57E+05	4.94E-01	1.99E-09	8.31E-10	1.01E-10
Benzo[a]pyrene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	2.89E-01	1.17E-08	4.86E-09	4.16E-13
Benzo[b]fluoranthene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.02E-01	2.03E-09	8.45E-10	7.23E-14
Benzo[k]fluoranthene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	3.99E-01	1.61E-10	6.71E-11	5.74E-15
Cadmium (Diet)	INORGANIC	-	-	-	1.36E+09	-	8.00E-01	-	-	3.46E-12
Chromium(III), Insoluble Salts	INORGANIC	-	-	-	1.36E+09	-	5.58E+01	-	-	-
Chromium(VI)	INORGANIC	-	-	-	1.36E+09	-	-	-	-	-
Chrysene	PAH	2.61E-02	6.75E-06	-	1.36E+09	-	5.48E-01	2.21E-11	9.22E-12	7.89E-16
Cobalt	INORGANIC	-	-	-	1.36E+09	-	1.24E+01	-	-	2.67E-10
Copper	INORGANIC	-	-	-	1.36E+09	-	1.12E+02	-	-	-
Dibenz[a,h]anthracene	PAH	4.46E-02	5.21E-06	-	1.36E+09	-	1.70E-01	6.86E-09	2.86E-09	2.45E-13
Indeno[1,2,3-cd]pyrene	PAH	4.48E-02	5.23E-06	-	1.36E+09	-	2.33E-01	9.40E-10	3.92E-10	3.35E-14
Manganese (Non-diet)	INORGANIC	-	-	-	1.36E+09	-	7.83E+02	-	-	-
Mercury (elemental)	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09	7.53E+03	2.23E-01	-	-	-
Nitroso-di-N-propylamine, N-	SVOC	5.64E-02	7.76E-06	-	1.36E+09	-	3.40E-01	9.61E-08	3.08E-08	1.63E-12
Thallium Sulfate	INORGANIC	-	-	-	1.36E+09	-	1.55E+00	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	-	3.01E-02	-	3.57E-04	3.04E-02
Antimony (metallic)	-	5.00E-02	-	-	5.00E-02
Aroclor 1260	2.06E-07	-	-	-	-
Arsenic, Inorganic	1.53E-07	2.15E-02	3.44E-03	4.25E-05	2.49E-02
Barium	-	1.40E-03	-	3.32E-06	1.40E-03
Benz[a]anthracene	2.93E-09	-	-	-	-
Benzo[a]pyrene	1.65E-08	2.84E-03	1.18E-03	2.53E-05	4.05E-03
Benzo[b]fluoranthene	2.87E-09	-	-	-	-
Benzo[k]fluoranthene	2.28E-10	-	-	-	-
Cadmium (Diet)	3.46E-12	4.71E-03	6.05E-04	1.40E-05	5.33E-03
Chromium(III), Insoluble Salts	-	1.10E-04	-	1.95E-06	1.11E-04
Chromium(VI)	-	-	-	-	-
Chrysene	3.13E-11	-	-	-	-
Cobalt	2.67E-10	1.22E-02	-	1.08E-04	1.23E-02
Copper	-	3.29E-02	-	-	3.29E-02
Dibenz[a,h]anthracene	9.72E-09	-	-	-	-
Indeno[1,2,3-cd]pyrene	1.33E-09	-	-	-	-
Manganese (Non-diet)	-	9.62E-02	-	2.74E-03	9.89E-02
Mercury (elemental)	-	-	-	2.35E-02	2.35E-02
Nitroso-di-N-propylamine, N-	1.27E-07	-	-	-	-
Thallium Sulfate	-	9.15E-02	-	-	9.15E-02



# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>0</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)
Zinc and Compounds	-	-	-	-	3.00E-01	A /Subchronic	-	-	1	-	1	-
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref
Zinc and Compounds	-	-	6.20E+01	-	-	-	1181.15	PHYSPROP	3170	YAWS
<i>*Total Risk/HL</i>	-	-	-	-	-	-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Chemical Type	$D_{ia}$ (cm <sup>2</sup> /s)	$D_{iw}$ (cm <sup>2</sup> /s)	$D_A$ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk
Zinc and Compounds	INORGANIC	-	-	-	1.36E+09	-	1.11E+02	-	-	-
<i>*Total Risk/HI</i>		-	-	-	-	-	-	<i>3.87E-07</i>	<i>1.22E-07</i>	<i>1.13E-08</i>

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Zinc and Compounds	-	1.09E-03	-	-	1.09E-03
<i>*Total Risk/HI</i>	<i>5.20E-07</i>	<i>3.44E-01</i>	<i>5.23E-03</i>	<i>2.68E-02</i>	<i>3.76E-01</i>

	A	B	C	D	E	F	G	H	I	J	K	L	
1	<b>UCL Statistics for Data Sets with Non-Detects</b>												
2													
3	User Selected Options												
4	Date/Time of Computation		ProUCL 5.11/24/2020 9:31:43 AM										
5	From File		AreaC_CC_SS_prouclin.xls										
6	Full Precision		OFF										
7	Confidence Coefficient		95%										
8	Number of Bootstrap Operations		2000										
9													
10													
11	<b>Aluminum</b>												
12													
13	<b>General Statistics</b>												
14	Total Number of Observations				19		Number of Distinct Observations				19		
15									Number of Missing Observations				0
16	Minimum				2190		Mean				7767		
17	Maximum				29900		Median				4610		
18	SD				7068		Std. Error of Mean				1622		
19	Coefficient of Variation				0.91		Skewness				1.941		
20													
21	<b>Normal GOF Test</b>												
22	Shapiro Wilk Test Statistic				0.76		<b>Shapiro Wilk GOF Test</b>						
23	5% Shapiro Wilk Critical Value				0.901		Data Not Normal at 5% Significance Level						
24	Lilliefors Test Statistic				0.234		<b>Lilliefors GOF Test</b>						
25	5% Lilliefors Critical Value				0.197		Data Not Normal at 5% Significance Level						
26	<b>Data Not Normal at 5% Significance Level</b>												
27													
28	<b>Assuming Normal Distribution</b>												
29	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
30	95% Student's-t UCL				10579		95% Adjusted-CLT UCL (Chen-1995)				11205		
31									95% Modified-t UCL (Johnson-1978)				10699
32													
33	<b>Gamma GOF Test</b>												
34	A-D Test Statistic				0.811		<b>Anderson-Darling Gamma GOF Test</b>						
35	5% A-D Critical Value				0.754		Data Not Gamma Distributed at 5% Significance Level						
36	K-S Test Statistic				0.194		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
37	5% K-S Critical Value				0.201		Detected data appear Gamma Distributed at 5% Significance Level						
38	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>												
39													
40	<b>Gamma Statistics</b>												
41	k hat (MLE)				1.748		k star (bias corrected MLE)				1.507		
42	Theta hat (MLE)				4444		Theta star (bias corrected MLE)				5154		
43	nu hat (MLE)				66.41		nu star (bias corrected)				57.26		
44	MLE Mean (bias corrected)				7767		MLE Sd (bias corrected)				6327		
45									Approximate Chi Square Value (0.05)				40.87
46	Adjusted Level of Significance				0.0369		Adjusted Chi Square Value				39.66		
47													
48	<b>Assuming Gamma Distribution</b>												
49	95% Approximate Gamma UCL (use when n>=50)				10883		95% Adjusted Gamma UCL (use when n<50)				11215		
50													
51	<b>Lognormal GOF Test</b>												
52	Shapiro Wilk Test Statistic				0.921		<b>Shapiro Wilk Lognormal GOF Test</b>						
53	5% Shapiro Wilk Critical Value				0.901		Data appear Lognormal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
54	Lilliefors Test Statistic					0.149	Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value					0.197	Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data					7.692	Mean of logged Data					8.645
60	Maximum of Logged Data					10.31	SD of logged Data					0.784
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL					11857	90% Chebyshev (MVUE) UCL					11970
64	95% Chebyshev (MVUE) UCL					13964	97.5% Chebyshev (MVUE) UCL					16731
65	99% Chebyshev (MVUE) UCL					22166						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL					10434	95% Jackknife UCL					10579
72	95% Standard Bootstrap UCL					10315	95% Bootstrap-t UCL					11711
73	95% Hall's Bootstrap UCL					12638	95% Percentile Bootstrap UCL					10718
74	95% BCA Bootstrap UCL					11451						
75	90% Chebyshev(Mean, Sd) UCL					12631	95% Chebyshev(Mean, Sd) UCL					14835
76	97.5% Chebyshev(Mean, Sd) UCL					17893	99% Chebyshev(Mean, Sd) UCL					23901
77												
78	Suggested UCL to Use											
79	95% Adjusted Gamma UCL					11215						
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												
89	Antimony											
90												
91	General Statistics											
92	Total Number of Observations					9	Number of Distinct Observations					9
93	Number of Detects					4	Number of Non-Detects					5
94	Number of Distinct Detects					4	Number of Distinct Non-Detects					5
95	Minimum Detect					7.1	Minimum Non-Detect					2.89
96	Maximum Detect					9.5	Maximum Non-Detect					3.23
97	Variance Detects					1.18	Percent Non-Detects					55.56%
98	Mean Detects					8.7	SD Detects					1.086
99	Median Detects					9.1	CV Detects					0.125
100	Skewness Detects					-1.785	Kurtosis Detects					3.339
101	Mean of Logged Detects					2.157	SD of Logged Detects					0.133
102												
103	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
104	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
105	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
106	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											

	A	B	C	D	E	F	G	H	I	J	K	L
107												
108	<b>Normal GOF Test on Detects Only</b>											
109	Shapiro Wilk Test Statistic					0.8	<b>Shapiro Wilk GOF Test</b>					
110	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Normal at 5% Significance Level					
111	Lilliefors Test Statistic					0.359	<b>Lilliefors GOF Test</b>					
112	5% Lilliefors Critical Value					0.375	Detected Data appear Normal at 5% Significance Level					
113	<b>Detected Data appear Normal at 5% Significance Level</b>											
114												
115	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
116	KM Mean					5.472	KM Standard Error of Mean					1.137
117	KM SD					2.954	95% KM (BCA) UCL					N/A
118	95% KM (t) UCL					7.587	95% KM (Percentile Bootstrap) UCL					N/A
119	95% KM (z) UCL					7.343	95% KM Bootstrap t UCL					N/A
120	90% KM Chebyshev UCL					8.884	95% KM Chebyshev UCL					10.43
121	97.5% KM Chebyshev UCL					12.57	99% KM Chebyshev UCL					16.79
122												
123	<b>Gamma GOF Tests on Detected Observations Only</b>											
124	A-D Test Statistic					0.604	<b>Anderson-Darling GOF Test</b>					
125	5% A-D Critical Value					0.656	Detected data appear Gamma Distributed at 5% Significance Level					
126	K-S Test Statistic					0.383	<b>Kolmogorov-Smirnov GOF</b>					
127	5% K-S Critical Value					0.394	Detected data appear Gamma Distributed at 5% Significance Level					
128	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
129												
130	<b>Gamma Statistics on Detected Data Only</b>											
131	k hat (MLE)					78.67	k star (bias corrected MLE)					19.83
132	Theta hat (MLE)					0.111	Theta star (bias corrected MLE)					0.439
133	nu hat (MLE)					629.3	nu star (bias corrected)					158.7
134	Mean (detects)					8.7						
135												
136	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
137	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
138	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
139	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
140	This is especially true when the sample size is small.											
141	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
142	Minimum					5.862	Mean					7.124
143	Maximum					9.5	Median					5.862
144	SD					1.637	CV					0.23
145	k hat (MLE)					22.66	k star (bias corrected MLE)					15.18
146	Theta hat (MLE)					0.314	Theta star (bias corrected MLE)					0.469
147	nu hat (MLE)					407.9	nu star (bias corrected)					273.2
148	Adjusted Level of Significance ( $\beta$ )					0.0231						
149	Approximate Chi Square Value (273.24, $\alpha$ )					236	Adjusted Chi Square Value (273.24, $\beta$ )					228.6
150	95% Gamma Approximate UCL (use when $n \geq 50$ )					8.249	95% Gamma Adjusted UCL (use when $n < 50$ )					N/A
151												
152	<b>Estimates of Gamma Parameters using KM Estimates</b>											
153	Mean (KM)					5.472	SD (KM)					2.954
154	Variance (KM)					8.728	SE of Mean (KM)					1.137
155	k hat (KM)					3.431	k star (KM)					2.361
156	nu hat (KM)					61.76	nu star (KM)					42.5
157	theta hat (KM)					1.595	theta star (KM)					2.317
158	80% gamma percentile (KM)					8.032	90% gamma percentile (KM)					10.24
159	95% gamma percentile (KM)					12.33	99% gamma percentile (KM)					16.91

	A	B	C	D	E	F	G	H	I	J	K	L
160												
161	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
162	Approximate Chi Square Value (42.50, $\alpha$ )					28.56	Adjusted Chi Square Value (42.50, $\beta$ )					26.17
163	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					8.145	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					8.888
164												
165	<b>Lognormal GOF Test on Detected Observations Only</b>											
166	Shapiro Wilk Test Statistic					0.781	<b>Shapiro Wilk GOF Test</b>					
167	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Lognormal at 5% Significance Level					
168	Lilliefors Test Statistic					0.369	<b>Lilliefors GOF Test</b>					
169	5% Lilliefors Critical Value					0.375	Detected Data appear Lognormal at 5% Significance Level					
170	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
171												
172	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
173	Mean in Original Scale					7.208	Mean in Log Scale					1.955
174	SD in Original Scale					1.564	SD in Log Scale					0.208
175	95% t UCL (assumes normality of ROS data)					8.177	95% Percentile Bootstrap UCL					8.103
176	95% BCA Bootstrap UCL					8.07	95% Bootstrap t UCL					8.293
177	95% H-UCL (Log ROS)					8.313						
178												
179	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
180	KM Mean (logged)					1.548	KM Geo Mean					4.703
181	KM SD (logged)					0.55	95% Critical H Value (KM-Log)					2.318
182	KM Standard Error of Mean (logged)					0.212	95% H-UCL (KM -Log)					8.585
183	KM SD (logged)					0.55	95% Critical H Value (KM-Log)					2.318
184	KM Standard Error of Mean (logged)					0.212						
185												
186	<b>DL/2 Statistics</b>											
187	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
188	Mean in Original Scale					4.721	Mean in Log Scale					1.197
189	SD in Original Scale					3.833	SD in Log Scale					0.915
190	95% t UCL (Assumes normality)					7.097	95% H-Stat UCL					13.5
191	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
192												
193	<b>Nonparametric Distribution Free UCL Statistics</b>											
194	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>											
195												
196	<b>Suggested UCL to Use</b>											
197	95% KM (t) UCL					7.587						
198												
199	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
200	Recommendations are based upon data size, data distribution, and skewness.											
201	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
202	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
203												
204												
205	<b>Arsenic</b>											
206												
207	<b>General Statistics</b>											
208	Total Number of Observations					19	Number of Distinct Observations					17
209							Number of Missing Observations					0
210	Minimum					1.3	Mean					3.407
211	Maximum					5.9	Median					3.54
212	SD					1.128	Std. Error of Mean					0.259



	A	B	C	D	E	F	G	H	I	J	K	L
213	Coefficient of Variation					0.331	Skewness					0.0427
214												
215	<b>Normal GOF Test</b>											
216	Shapiro Wilk Test Statistic					0.952	<b>Shapiro Wilk GOF Test</b>					
217	5% Shapiro Wilk Critical Value					0.901	Data appear Normal at 5% Significance Level					
218	Lilliefors Test Statistic					0.142	<b>Lilliefors GOF Test</b>					
219	5% Lilliefors Critical Value					0.197	Data appear Normal at 5% Significance Level					
220	<b>Data appear Normal at 5% Significance Level</b>											
221												
222	<b>Assuming Normal Distribution</b>											
223	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
224	95% Student's-t UCL					3.855	95% Adjusted-CLT UCL (Chen-1995)					3.835
225							95% Modified-t UCL (Johnson-1978)					3.856
226												
227	<b>Gamma GOF Test</b>											
228	A-D Test Statistic					0.706	<b>Anderson-Darling Gamma GOF Test</b>					
229	5% A-D Critical Value					0.742	Detected data appear Gamma Distributed at 5% Significance Level					
230	K-S Test Statistic					0.179	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
231	5% K-S Critical Value					0.199	Detected data appear Gamma Distributed at 5% Significance Level					
232	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
233												
234	<b>Gamma Statistics</b>											
235	k hat (MLE)					8.115	k star (bias corrected MLE)					6.869
236	Theta hat (MLE)					0.42	Theta star (bias corrected MLE)					0.496
237	nu hat (MLE)					308.4	nu star (bias corrected)					261
238	MLE Mean (bias corrected)					3.407	MLE Sd (bias corrected)					1.3
239							Approximate Chi Square Value (0.05)					224.6
240	Adjusted Level of Significance					0.0369	Adjusted Chi Square Value					221.6
241												
242	<b>Assuming Gamma Distribution</b>											
243	95% Approximate Gamma UCL (use when n>=50))					3.959	95% Adjusted Gamma UCL (use when n<50)					4.012
244												
245	<b>Lognormal GOF Test</b>											
246	Shapiro Wilk Test Statistic					0.877	<b>Shapiro Wilk Lognormal GOF Test</b>					
247	5% Shapiro Wilk Critical Value					0.901	Data Not Lognormal at 5% Significance Level					
248	Lilliefors Test Statistic					0.208	<b>Lilliefors Lognormal GOF Test</b>					
249	5% Lilliefors Critical Value					0.197	Data Not Lognormal at 5% Significance Level					
250	<b>Data Not Lognormal at 5% Significance Level</b>											
251												
252	<b>Lognormal Statistics</b>											
253	Minimum of Logged Data					0.262	Mean of logged Data					1.163
254	Maximum of Logged Data					1.775	SD of logged Data					0.389
255												
256	<b>Assuming Lognormal Distribution</b>											
257	95% H-UCL					4.112	90% Chebyshev (MVUE) UCL					4.377
258	95% Chebyshev (MVUE) UCL					4.803	97.5% Chebyshev (MVUE) UCL					5.395
259	99% Chebyshev (MVUE) UCL					6.556						
260												
261	<b>Nonparametric Distribution Free UCL Statistics</b>											
262	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
263												
264	<b>Nonparametric Distribution Free UCLs</b>											
265	95% CLT UCL					3.832	95% Jackknife UCL					3.855

	A	B	C	D	E	F	G	H	I	J	K	L
266	95% Standard Bootstrap UCL					3.817	95% Bootstrap-t UCL					3.853
267	95% Hall's Bootstrap UCL					3.885	95% Percentile Bootstrap UCL					3.828
268	95% BCA Bootstrap UCL					3.794						
269	90% Chebyshev(Mean, Sd) UCL					4.183	95% Chebyshev(Mean, Sd) UCL					4.535
270	97.5% Chebyshev(Mean, Sd) UCL					5.022	99% Chebyshev(Mean, Sd) UCL					5.981
271												
272	<b>Suggested UCL to Use</b>											
273	95% Student's-t UCL					3.855						
274												
275	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
276	Recommendations are based upon data size, data distribution, and skewness.											
277	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
278	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
279												
280												
281	<b>Barium</b>											
282												
283	<b>General Statistics</b>											
284	Total Number of Observations					19	Number of Distinct Observations					19
285							Number of Missing Observations					0
286	Minimum					14.1	Mean					99.46
287	Maximum					267	Median					69.4
288	SD					80.32	Std. Error of Mean					18.43
289	Coefficient of Variation					0.807	Skewness					0.816
290												
291	<b>Normal GOF Test</b>											
292	Shapiro Wilk Test Statistic					0.873	<b>Shapiro Wilk GOF Test</b>					
293	5% Shapiro Wilk Critical Value					0.901	Data Not Normal at 5% Significance Level					
294	Lilliefors Test Statistic					0.251	<b>Lilliefors GOF Test</b>					
295	5% Lilliefors Critical Value					0.197	Data Not Normal at 5% Significance Level					
296	<b>Data Not Normal at 5% Significance Level</b>											
297												
298	<b>Assuming Normal Distribution</b>											
299	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
300	95% Student's-t UCL					131.4	95% Adjusted-CLT UCL (Chen-1995)					133.5
301							95% Modified-t UCL (Johnson-1978)					132
302												
303	<b>Gamma GOF Test</b>											
304	A-D Test Statistic					0.424	<b>Anderson-Darling Gamma GOF Test</b>					
305	5% A-D Critical Value					0.757	Detected data appear Gamma Distributed at 5% Significance Level					
306	K-S Test Statistic					0.154	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
307	5% K-S Critical Value					0.202	Detected data appear Gamma Distributed at 5% Significance Level					
308	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
309												
310	<b>Gamma Statistics</b>											
311	k hat (MLE)					1.537	k star (bias corrected MLE)					1.33
312	Theta hat (MLE)					64.7	Theta star (bias corrected MLE)					74.8
313	nu hat (MLE)					58.42	nu star (bias corrected)					50.53
314	MLE Mean (bias corrected)					99.46	MLE Sd (bias corrected)					86.26
315							Approximate Chi Square Value (0.05)					35.21
316	Adjusted Level of Significance					0.0369	Adjusted Chi Square Value					34.09
317												
318	<b>Assuming Gamma Distribution</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
319	95% Approximate Gamma UCL (use when n>=50)					142.8	95% Adjusted Gamma UCL (use when n<50)					147.4
320												
321	<b>Lognormal GOF Test</b>											
322	Shapiro Wilk Test Statistic					0.948	<b>Shapiro Wilk Lognormal GOF Test</b>					
323	5% Shapiro Wilk Critical Value					0.901	Data appear Lognormal at 5% Significance Level					
324	Lilliefors Test Statistic					0.133	<b>Lilliefors Lognormal GOF Test</b>					
325	5% Lilliefors Critical Value					0.197	Data appear Lognormal at 5% Significance Level					
326	<b>Data appear Lognormal at 5% Significance Level</b>											
327												
328	<b>Lognormal Statistics</b>											
329	Minimum of Logged Data					2.646	Mean of logged Data					4.241
330	Maximum of Logged Data					5.587	SD of logged Data					0.921
331												
332	<b>Assuming Lognormal Distribution</b>											
333	95% H-UCL					182.8	90% Chebyshev (MVUE) UCL					175
334	95% Chebyshev (MVUE) UCL					207.6	97.5% Chebyshev (MVUE) UCL					252.8
335	99% Chebyshev (MVUE) UCL					341.7						
336												
337	<b>Nonparametric Distribution Free UCL Statistics</b>											
338	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
339												
340	<b>Nonparametric Distribution Free UCLs</b>											
341	95% CLT UCL					129.8	95% Jackknife UCL					131.4
342	95% Standard Bootstrap UCL					129.1	95% Bootstrap-t UCL					135.9
343	95% Hall's Bootstrap UCL					131.6	95% Percentile Bootstrap UCL					131.3
344	95% BCA Bootstrap UCL					131.9						
345	90% Chebyshev(Mean, Sd) UCL					154.7	95% Chebyshev(Mean, Sd) UCL					179.8
346	97.5% Chebyshev(Mean, Sd) UCL					214.5	99% Chebyshev(Mean, Sd) UCL					282.8
347												
348	<b>Suggested UCL to Use</b>											
349	95% Adjusted Gamma UCL					147.4						
350												
351	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
352	Recommendations are based upon data size, data distribution, and skewness.											
353	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
354	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
355												
356												
357	<b>Cadmium</b>											
358												
359	<b>General Statistics</b>											
360	Total Number of Observations					8	Number of Distinct Observations					8
361							Number of Missing Observations					0
362	Minimum					0.56	Mean					1.023
363	Maximum					2.1	Median					0.935
364	SD					0.49	Std. Error of Mean					0.173
365	Coefficient of Variation					0.48	Skewness					1.713
366												
367	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
368	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
369	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
370	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
371												

	A	B	C	D	E	F	G	H	I	J	K	L
372	<b>Normal GOF Test</b>											
373	Shapiro Wilk Test Statistic					0.837	<b>Shapiro Wilk GOF Test</b>					
374	5% Shapiro Wilk Critical Value					0.818	Data appear Normal at 5% Significance Level					
375	Lilliefors Test Statistic					0.234	<b>Lilliefors GOF Test</b>					
376	5% Lilliefors Critical Value					0.283	Data appear Normal at 5% Significance Level					
377	<b>Data appear Normal at 5% Significance Level</b>											
378												
379	<b>Assuming Normal Distribution</b>											
380	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
381	95% Student's-t UCL					1.351	95% Adjusted-CLT UCL (Chen-1995)					1.42
382							95% Modified-t UCL (Johnson-1978)					1.368
383												
384	<b>Gamma GOF Test</b>											
385	A-D Test Statistic					0.314	<b>Anderson-Darling Gamma GOF Test</b>					
386	5% A-D Critical Value					0.718	Detected data appear Gamma Distributed at 5% Significance Level					
387	K-S Test Statistic					0.17	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
388	5% K-S Critical Value					0.295	Detected data appear Gamma Distributed at 5% Significance Level					
389	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
390												
391	<b>Gamma Statistics</b>											
392	k hat (MLE)					6.109	k star (bias corrected MLE)					3.901
393	Theta hat (MLE)					0.167	Theta star (bias corrected MLE)					0.262
394	nu hat (MLE)					97.74	nu star (bias corrected)					62.42
395	MLE Mean (bias corrected)					1.023	MLE Sd (bias corrected)					0.518
396							Approximate Chi Square Value (0.05)					45.25
397	Adjusted Level of Significance					0.0195	Adjusted Chi Square Value					41.58
398												
399	<b>Assuming Gamma Distribution</b>											
400	95% Approximate Gamma UCL (use when n>=50))					1.411	95% Adjusted Gamma UCL (use when n<50)					1.535
401												
402	<b>Lognormal GOF Test</b>											
403	Shapiro Wilk Test Statistic					0.948	<b>Shapiro Wilk Lognormal GOF Test</b>					
404	5% Shapiro Wilk Critical Value					0.818	Data appear Lognormal at 5% Significance Level					
405	Lilliefors Test Statistic					0.157	<b>Lilliefors Lognormal GOF Test</b>					
406	5% Lilliefors Critical Value					0.283	Data appear Lognormal at 5% Significance Level					
407	<b>Data appear Lognormal at 5% Significance Level</b>											
408												
409	<b>Lognormal Statistics</b>											
410	Minimum of Logged Data					-0.58	Mean of logged Data					-0.0618
411	Maximum of Logged Data					0.742	SD of logged Data					0.423
412												
413	<b>Assuming Lognormal Distribution</b>											
414	95% H-UCL					1.469	90% Chebyshev (MVUE) UCL					1.476
415	95% Chebyshev (MVUE) UCL					1.684	97.5% Chebyshev (MVUE) UCL					1.973
416	99% Chebyshev (MVUE) UCL					2.54						
417												
418	<b>Nonparametric Distribution Free UCL Statistics</b>											
419	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
420												
421	<b>Nonparametric Distribution Free UCLs</b>											
422	95% CLT UCL					1.308	95% Jackknife UCL					1.351
423	95% Standard Bootstrap UCL					1.288	95% Bootstrap-t UCL					1.574
424	95% Hall's Bootstrap UCL					2.625	95% Percentile Bootstrap UCL					1.311

	A	B	C	D	E	F	G	H	I	J	K	L
425	95% BCA Bootstrap UCL					1.389						
426	90% Chebyshev(Mean, Sd) UCL					1.543	95% Chebyshev(Mean, Sd) UCL					1.778
427	97.5% Chebyshev(Mean, Sd) UCL					2.105	99% Chebyshev(Mean, Sd) UCL					2.747
428												
429	<b>Suggested UCL to Use</b>											
430	95% Student's-t UCL					1.351						
431												
432	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
433	Recommendations are based upon data size, data distribution, and skewness.											
434	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
435	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
436												
437												
438	<b>Chromium</b>											
439												
440	<b>General Statistics</b>											
441	Total Number of Observations					19	Number of Distinct Observations					18
442							Number of Missing Observations					0
443	Minimum					1	Mean					26.14
444	Maximum					303	Median					10.8
445	SD					67.32	Std. Error of Mean					15.45
446	Coefficient of Variation					2.575	Skewness					4.299
447												
448	<b>Normal GOF Test</b>											
449	Shapiro Wilk Test Statistic					0.322	<b>Shapiro Wilk GOF Test</b>					
450	5% Shapiro Wilk Critical Value					0.901	Data Not Normal at 5% Significance Level					
451	Lilliefors Test Statistic					0.456	<b>Lilliefors GOF Test</b>					
452	5% Lilliefors Critical Value					0.197	Data Not Normal at 5% Significance Level					
453	<b>Data Not Normal at 5% Significance Level</b>											
454												
455	<b>Assuming Normal Distribution</b>											
456	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
457	95% Student's-t UCL					52.92	95% Adjusted-CLT UCL (Chen-1995)					67.82
458							95% Modified-t UCL (Johnson-1978)					55.46
459												
460	<b>Gamma GOF Test</b>											
461	A-D Test Statistic					2.583	<b>Anderson-Darling Gamma GOF Test</b>					
462	5% A-D Critical Value					0.787	Data Not Gamma Distributed at 5% Significance Level					
463	K-S Test Statistic					0.318	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
464	5% K-S Critical Value					0.207	Data Not Gamma Distributed at 5% Significance Level					
465	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
466												
467	<b>Gamma Statistics</b>											
468	k hat (MLE)					0.669	k star (bias corrected MLE)					0.598
469	Theta hat (MLE)					39.09	Theta star (bias corrected MLE)					43.7
470	nu hat (MLE)					25.41	nu star (bias corrected)					22.73
471	MLE Mean (bias corrected)					26.14	MLE Sd (bias corrected)					33.8
472							Approximate Chi Square Value (0.05)					12.89
473	Adjusted Level of Significance					0.0369	Adjusted Chi Square Value					12.24
474												
475	<b>Assuming Gamma Distribution</b>											
476	95% Approximate Gamma UCL (use when n>=50))					46.11	95% Adjusted Gamma UCL (use when n<50)					48.54
477												

	A	B	C	D	E	F	G	H	I	J	K	L
478	<b>Lognormal GOF Test</b>											
479	Shapiro Wilk Test Statistic					0.862	<b>Shapiro Wilk Lognormal GOF Test</b>					
480	5% Shapiro Wilk Critical Value					0.901	Data Not Lognormal at 5% Significance Level					
481	Lilliefors Test Statistic					0.189	<b>Lilliefors Lognormal GOF Test</b>					
482	5% Lilliefors Critical Value					0.197	Data appear Lognormal at 5% Significance Level					
483	<b>Data appear Approximate Lognormal at 5% Significance Level</b>											
484												
485	<b>Lognormal Statistics</b>											
486	Minimum of Logged Data					0	Mean of logged Data					2.354
487	Maximum of Logged Data					5.714	SD of logged Data					1.094
488												
489	<b>Assuming Lognormal Distribution</b>											
490	95% H-UCL					38.87	90% Chebyshev (MVUE) UCL					33.82
491	95% Chebyshev (MVUE) UCL					40.87	97.5% Chebyshev (MVUE) UCL					50.64
492	99% Chebyshev (MVUE) UCL					69.84						
493												
494	<b>Nonparametric Distribution Free UCL Statistics</b>											
495	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
496												
497	<b>Nonparametric Distribution Free UCLs</b>											
498	95% CLT UCL					51.55	95% Jackknife UCL					52.92
499	95% Standard Bootstrap UCL					50.3	95% Bootstrap-t UCL					240
500	95% Hall's Bootstrap UCL					171.6	95% Percentile Bootstrap UCL					56.52
501	95% BCA Bootstrap UCL					73.65						
502	90% Chebyshev(Mean, Sd) UCL					72.48	95% Chebyshev(Mean, Sd) UCL					93.47
503	97.5% Chebyshev(Mean, Sd) UCL					122.6	99% Chebyshev(Mean, Sd) UCL					179.8
504												
505	<b>Suggested UCL to Use</b>											
506	95% Chebyshev (Mean, Sd) UCL					93.47						
507												
508	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
509	Recommendations are based upon data size, data distribution, and skewness.											
510	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
511	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
512												
513	<b>Cobalt</b>											
514												
515	<b>General Statistics</b>											
516	Total Number of Observations					12	Number of Distinct Observations					12
517	Number of Detects					11	Number of Non-Detects					1
518	Number of Distinct Detects					11	Number of Distinct Non-Detects					1
519	Minimum Detect					2.7	Minimum Non-Detect					2.41
520	Maximum Detect					59.6	Maximum Non-Detect					2.41
521	Variance Detects					296.2	Percent Non-Detects					8.333%
522	Mean Detects					11.51	SD Detects					17.21
523	Median Detects					5.2	CV Detects					1.495
524	Skewness Detects					2.653	Kurtosis Detects					7.141
525	Mean of Logged Detects					1.873	SD of Logged Detects					0.958
526												
527	<b>Normal GOF Test on Detects Only</b>											
528	Shapiro Wilk Test Statistic					0.557	<b>Shapiro Wilk GOF Test</b>					
529	5% Shapiro Wilk Critical Value					0.85	Detected Data Not Normal at 5% Significance Level					
530	Lilliefors Test Statistic					0.422	<b>Lilliefors GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
531	5% Lilliefors Critical Value					0.251	Detected Data Not Normal at 5% Significance Level					
532	<b>Detected Data Not Normal at 5% Significance Level</b>											
533												
534	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
535	KM Mean					10.76	KM Standard Error of Mean					4.818
536	KM SD					15.91	95% KM (BCA) UCL					18.42
537	95% KM (t) UCL					19.41	95% KM (Percentile Bootstrap) UCL					19.34
538	95% KM (z) UCL					18.68	95% KM Bootstrap t UCL					82.58
539	90% KM Chebyshev UCL					25.21	95% KM Chebyshev UCL					31.76
540	97.5% KM Chebyshev UCL					40.84	99% KM Chebyshev UCL					58.69
541												
542	<b>Gamma GOF Tests on Detected Observations Only</b>											
543	A-D Test Statistic					1.473	<b>Anderson-Darling GOF Test</b>					
544	5% A-D Critical Value					0.751	Detected Data Not Gamma Distributed at 5% Significance Level					
545	K-S Test Statistic					0.364	<b>Kolmogorov-Smirnov GOF</b>					
546	5% K-S Critical Value					0.262	Detected Data Not Gamma Distributed at 5% Significance Level					
547	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
548												
549	<b>Gamma Statistics on Detected Data Only</b>											
550	k hat (MLE)					1.01	k star (bias corrected MLE)					0.795
551	Theta hat (MLE)					11.4	Theta star (bias corrected MLE)					14.48
552	nu hat (MLE)					22.22	nu star (bias corrected)					17.5
553	Mean (detects)					11.51						
554												
555	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
556	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
557	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
558	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
559	This is especially true when the sample size is small.											
560	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
561	Minimum					0.01	Mean					10.56
562	Maximum					59.6	Median					5.05
563	SD					16.74	CV					1.586
564	k hat (MLE)					0.603	k star (bias corrected MLE)					0.508
565	Theta hat (MLE)					17.5	Theta star (bias corrected MLE)					20.78
566	nu hat (MLE)					14.48	nu star (bias corrected)					12.19
567	Adjusted Level of Significance ( $\beta$ )					0.029						
568	Approximate Chi Square Value (12.19, $\alpha$ )					5.352	Adjusted Chi Square Value (12.19, $\beta$ )					4.679
569	95% Gamma Approximate UCL (use when $n \geq 50$ )					24.04	95% Gamma Adjusted UCL (use when $n < 50$ )					27.5
570												
571	<b>Estimates of Gamma Parameters using KM Estimates</b>											
572	Mean (KM)					10.76	SD (KM)					15.91
573	Variance (KM)					253.2	SE of Mean (KM)					4.818
574	k hat (KM)					0.457	k star (KM)					0.398
575	nu hat (KM)					10.97	nu star (KM)					9.558
576	theta hat (KM)					23.54	theta star (KM)					27.01
577	80% gamma percentile (KM)					17.35	90% gamma percentile (KM)					30.4
578	95% gamma percentile (KM)					44.76	99% gamma percentile (KM)					80.87
579												
580	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
581	Approximate Chi Square Value (9.56, $\alpha$ )					3.667	Adjusted Chi Square Value (9.56, $\beta$ )					3.131
582	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					28.03	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					32.83
583												

	A	B	C	D	E	F	G	H	I	J	K	L	
584	<b>Lognormal GOF Test on Detected Observations Only</b>												
585	Shapiro Wilk Test Statistic				0.8	<b>Shapiro Wilk GOF Test</b>							
586	5% Shapiro Wilk Critical Value				0.85	Detected Data Not Lognormal at 5% Significance Level							
587	Lilliefors Test Statistic				0.288	<b>Lilliefors GOF Test</b>							
588	5% Lilliefors Critical Value				0.251	Detected Data Not Lognormal at 5% Significance Level							
589	<b>Detected Data Not Lognormal at 5% Significance Level</b>												
590													
591	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
592	Mean in Original Scale				10.62	Mean in Log Scale				1.693			
593	SD in Original Scale				16.7	SD in Log Scale				1.106			
594	95% t UCL (assumes normality of ROS data)				19.28	95% Percentile Bootstrap UCL				18.47			
595	95% BCA Bootstrap UCL				22.82	95% Bootstrap t UCL				70.38			
596	95% H-UCL (Log ROS)				28.3								
597													
598	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
599	KM Mean (logged)				1.79	KM Geo Mean				5.99			
600	KM SD (logged)				0.917	95% Critical H Value (KM-Log)				2.767			
601	KM Standard Error of Mean (logged)				0.278	95% H-UCL (KM -Log)				19.58			
602	KM SD (logged)				0.917	95% Critical H Value (KM-Log)				2.767			
603	KM Standard Error of Mean (logged)				0.278								
604													
605	<b>DL/2 Statistics</b>												
606	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>						
607	Mean in Original Scale				10.66	Mean in Log Scale				1.732			
608	SD in Original Scale				16.68	SD in Log Scale				1.035			
609	95% t UCL (Assumes normality)				19.3	95% H-Stat UCL				24.47			
610	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
611													
612	<b>Nonparametric Distribution Free UCL Statistics</b>												
613	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>												
614													
615	<b>Suggested UCL to Use</b>												
616	95% KM (Chebyshev) UCL				31.76								
617													
618	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
619	Recommendations are based upon data size, data distribution, and skewness.												
620	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
621	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
622													
623													
624	<b>Copper</b>												
625													
626	<b>General Statistics</b>												
627	Total Number of Observations				8	Number of Distinct Observations				8			
628						Number of Missing Observations				0			
629	Minimum				5.67	Mean				50.25			
630	Maximum				132	Median				30.4			
631	SD				50.38	Std. Error of Mean				17.81			
632	Coefficient of Variation				1.003	Skewness				0.99			
633													
634	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>												
635	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>												
636	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>												



	A	B	C	D	E	F	G	H	I	J	K	L
637	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
638												
639	<b>Normal GOF Test</b>											
640	Shapiro Wilk Test Statistic				0.816		<b>Shapiro Wilk GOF Test</b>					
641	5% Shapiro Wilk Critical Value				0.818		Data Not Normal at 5% Significance Level					
642	Lilliefors Test Statistic				0.252		<b>Lilliefors GOF Test</b>					
643	5% Lilliefors Critical Value				0.283		Data appear Normal at 5% Significance Level					
644	<b>Data appear Approximate Normal at 5% Significance Level</b>											
645												
646	<b>Assuming Normal Distribution</b>											
647	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
648	95% Student's-t UCL				83.99		95% Adjusted-CLT UCL (Chen-1995)				86.21	
649							95% Modified-t UCL (Johnson-1978)				85.03	
650												
651	<b>Gamma GOF Test</b>											
652	A-D Test Statistic				0.398		<b>Anderson-Darling Gamma GOF Test</b>					
653	5% A-D Critical Value				0.734		Detected data appear Gamma Distributed at 5% Significance Level					
654	K-S Test Statistic				0.244		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
655	5% K-S Critical Value				0.301		Detected data appear Gamma Distributed at 5% Significance Level					
656	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
657												
658	<b>Gamma Statistics</b>											
659	k hat (MLE)				1.078		k star (bias corrected MLE)				0.757	
660	Theta hat (MLE)				46.62		Theta star (bias corrected MLE)				66.38	
661	nu hat (MLE)				17.25		nu star (bias corrected)				12.11	
662	MLE Mean (bias corrected)				50.25		MLE Sd (bias corrected)				57.75	
663							Approximate Chi Square Value (0.05)				5.301	
664	Adjusted Level of Significance				0.0195		Adjusted Chi Square Value				4.218	
665												
666	<b>Assuming Gamma Distribution</b>											
667	95% Approximate Gamma UCL (use when n>=50))				114.8		95% Adjusted Gamma UCL (use when n<50)				144.3	
668												
669	<b>Lognormal GOF Test</b>											
670	Shapiro Wilk Test Statistic				0.93		<b>Shapiro Wilk Lognormal GOF Test</b>					
671	5% Shapiro Wilk Critical Value				0.818		Data appear Lognormal at 5% Significance Level					
672	Lilliefors Test Statistic				0.201		<b>Lilliefors Lognormal GOF Test</b>					
673	5% Lilliefors Critical Value				0.283		Data appear Lognormal at 5% Significance Level					
674	<b>Data appear Lognormal at 5% Significance Level</b>											
675												
676	<b>Lognormal Statistics</b>											
677	Minimum of Logged Data				1.735		Mean of logged Data				3.386	
678	Maximum of Logged Data				4.883		SD of logged Data				1.162	
679												
680	<b>Assuming Lognormal Distribution</b>											
681	95% H-UCL				313.1		90% Chebyshev (MVUE) UCL				116.4	
682	95% Chebyshev (MVUE) UCL				145.8		97.5% Chebyshev (MVUE) UCL				186.5	
683	99% Chebyshev (MVUE) UCL				266.6							
684												
685	<b>Nonparametric Distribution Free UCL Statistics</b>											
686	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
687												
688	<b>Nonparametric Distribution Free UCLs</b>											
689	95% CLT UCL				79.55		95% Jackknife UCL				83.99	

	A	B	C	D	E	F	G	H	I	J	K	L
690	95% Standard Bootstrap UCL					77.61	95% Bootstrap-t UCL					114.5
691	95% Hall's Bootstrap UCL					113.3	95% Percentile Bootstrap UCL					78.81
692	95% BCA Bootstrap UCL					84.95						
693	90% Chebyshev(Mean, Sd) UCL					103.7	95% Chebyshev(Mean, Sd) UCL					127.9
694	97.5% Chebyshev(Mean, Sd) UCL					161.5	99% Chebyshev(Mean, Sd) UCL					227.5
695												
696	<b>Suggested UCL to Use</b>											
697	95% Student's-t UCL					83.99						
698												
699	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
700	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
701												
702	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
703	Recommendations are based upon data size, data distribution, and skewness.											
704	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
705	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
706												
707												
708	<b>Lead</b>											
709												
710	<b>General Statistics</b>											
711	Total Number of Observations					14	Number of Distinct Observations					14
712							Number of Missing Observations					0
713	Minimum					7.66	Mean					93.43
714	Maximum					477	Median					48.7
715	SD					120.4	Std. Error of Mean					32.17
716	Coefficient of Variation					1.288	Skewness					2.819
717												
718	<b>Normal GOF Test</b>											
719	Shapiro Wilk Test Statistic					0.646	<b>Shapiro Wilk GOF Test</b>					
720	5% Shapiro Wilk Critical Value					0.874	Data Not Normal at 5% Significance Level					
721	Lilliefors Test Statistic					0.244	<b>Lilliefors GOF Test</b>					
722	5% Lilliefors Critical Value					0.226	Data Not Normal at 5% Significance Level					
723	<b>Data Not Normal at 5% Significance Level</b>											
724												
725	<b>Assuming Normal Distribution</b>											
726	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
727	95% Student's-t UCL					150.4	95% Adjusted-CLT UCL (Chen-1995)					172.2
728							95% Modified-t UCL (Johnson-1978)					154.4
729												
730	<b>Gamma GOF Test</b>											
731	A-D Test Statistic					0.437	<b>Anderson-Darling Gamma GOF Test</b>					
732	5% A-D Critical Value					0.759	Detected data appear Gamma Distributed at 5% Significance Level					
733	K-S Test Statistic					0.168	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
734	5% K-S Critical Value					0.235	Detected data appear Gamma Distributed at 5% Significance Level					
735	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
736												
737	<b>Gamma Statistics</b>											
738	k hat (MLE)					1.069	k star (bias corrected MLE)					0.888
739	Theta hat (MLE)					87.37	Theta star (bias corrected MLE)					105.2
740	nu hat (MLE)					29.94	nu star (bias corrected)					24.86
741	MLE Mean (bias corrected)					93.43	MLE Sd (bias corrected)					99.16
742							Approximate Chi Square Value (0.05)					14.5

	A	B	C	D	E	F	G	H	I	J	K	L
743	Adjusted Level of Significance					0.0312	Adjusted Chi Square Value					13.46
744												
745	<b>Assuming Gamma Distribution</b>											
746	95% Approximate Gamma UCL (use when n>=50)					160.1	95% Adjusted Gamma UCL (use when n<50)					172.5
747												
748	<b>Lognormal GOF Test</b>											
749	Shapiro Wilk Test Statistic					0.98	<b>Shapiro Wilk Lognormal GOF Test</b>					
750	5% Shapiro Wilk Critical Value					0.874	Data appear Lognormal at 5% Significance Level					
751	Lilliefors Test Statistic					0.138	<b>Lilliefors Lognormal GOF Test</b>					
752	5% Lilliefors Critical Value					0.226	Data appear Lognormal at 5% Significance Level					
753	<b>Data appear Lognormal at 5% Significance Level</b>											
754												
755	<b>Lognormal Statistics</b>											
756	Minimum of Logged Data					2.036	Mean of logged Data					4.002
757	Maximum of Logged Data					6.168	SD of logged Data					1.069
758												
759	<b>Assuming Lognormal Distribution</b>											
760	95% H-UCL					229.5	90% Chebyshev (MVUE) UCL					177.1
761	95% Chebyshev (MVUE) UCL					215.9	97.5% Chebyshev (MVUE) UCL					269.8
762	99% Chebyshev (MVUE) UCL					375.6						
763												
764	<b>Nonparametric Distribution Free UCL Statistics</b>											
765	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
766												
767	<b>Nonparametric Distribution Free UCLs</b>											
768	95% CLT UCL					146.3	95% Jackknife UCL					150.4
769	95% Standard Bootstrap UCL					146	95% Bootstrap-t UCL					225.8
770	95% Hall's Bootstrap UCL					351.4	95% Percentile Bootstrap UCL					150.1
771	95% BCA Bootstrap UCL					185.1						
772	90% Chebyshev(Mean, Sd) UCL					189.9	95% Chebyshev(Mean, Sd) UCL					233.6
773	97.5% Chebyshev(Mean, Sd) UCL					294.3	99% Chebyshev(Mean, Sd) UCL					413.5
774												
775	<b>Suggested UCL to Use</b>											
776	95% Adjusted Gamma UCL					172.5						
777												
778	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
779	Recommendations are based upon data size, data distribution, and skewness.											
780	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
781	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
782												
783												
784	<b>Manganese</b>											
785												
786	<b>General Statistics</b>											
787	Total Number of Observations					19	Number of Distinct Observations					19
788							Number of Missing Observations					0
789	Minimum					68.9	Mean					546
790	Maximum					1650	Median					378
791	SD					487.9	Std. Error of Mean					111.9
792	Coefficient of Variation					0.894	Skewness					1.284
793												
794	<b>Normal GOF Test</b>											
795	Shapiro Wilk Test Statistic					0.818	<b>Shapiro Wilk GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
796	5% Shapiro Wilk Critical Value					0.901	Data Not Normal at 5% Significance Level					
797	Lilliefors Test Statistic					0.256	Lilliefors GOF Test					
798	5% Lilliefors Critical Value					0.197	Data Not Normal at 5% Significance Level					
799	Data Not Normal at 5% Significance Level											
800												
801	Assuming Normal Distribution											
802	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
803	95% Student's-t UCL					740.1	95% Adjusted-CLT UCL (Chen-1995)					765.4
804							95% Modified-t UCL (Johnson-1978)					745.6
805												
806	Gamma GOF Test											
807	A-D Test Statistic					0.482	Anderson-Darling Gamma GOF Test					
808	5% A-D Critical Value					0.757	Detected data appear Gamma Distributed at 5% Significance Level					
809	K-S Test Statistic					0.15	Kolmogorov-Smirnov Gamma GOF Test					
810	5% K-S Critical Value					0.202	Detected data appear Gamma Distributed at 5% Significance Level					
811	Detected data appear Gamma Distributed at 5% Significance Level											
812												
813	Gamma Statistics											
814	k hat (MLE)					1.506	k star (bias corrected MLE)					1.303
815	Theta hat (MLE)					362.6	Theta star (bias corrected MLE)					419
816	nu hat (MLE)					57.22	nu star (bias corrected)					49.52
817	MLE Mean (bias corrected)					546	MLE Sd (bias corrected)					478.3
818							Approximate Chi Square Value (0.05)					34.36
819	Adjusted Level of Significance					0.0369	Adjusted Chi Square Value					33.26
820												
821	Assuming Gamma Distribution											
822	95% Approximate Gamma UCL (use when n>=50)					786.9	95% Adjusted Gamma UCL (use when n<50)					813
823												
824	Lognormal GOF Test											
825	Shapiro Wilk Test Statistic					0.966	Shapiro Wilk Lognormal GOF Test					
826	5% Shapiro Wilk Critical Value					0.901	Data appear Lognormal at 5% Significance Level					
827	Lilliefors Test Statistic					0.0965	Lilliefors Lognormal GOF Test					
828	5% Lilliefors Critical Value					0.197	Data appear Lognormal at 5% Significance Level					
829	Data appear Lognormal at 5% Significance Level											
830												
831	Lognormal Statistics											
832	Minimum of Logged Data					4.233	Mean of logged Data					5.935
833	Maximum of Logged Data					7.409	SD of logged Data					0.895
834												
835	Assuming Lognormal Distribution											
836	95% H-UCL					949.8	90% Chebyshev (MVUE) UCL					920
837	95% Chebyshev (MVUE) UCL					1088	97.5% Chebyshev (MVUE) UCL					1321
838	99% Chebyshev (MVUE) UCL					1780						
839												
840	Nonparametric Distribution Free UCL Statistics											
841	Data appear to follow a Discernible Distribution at 5% Significance Level											
842												
843	Nonparametric Distribution Free UCLs											
844	95% CLT UCL					730.2	95% Jackknife UCL					740.1
845	95% Standard Bootstrap UCL					718.8	95% Bootstrap-t UCL					806.2
846	95% Hall's Bootstrap UCL					735.8	95% Percentile Bootstrap UCL					729.2
847	95% BCA Bootstrap UCL					762.5						
848	90% Chebyshev(Mean, Sd) UCL					881.9	95% Chebyshev(Mean, Sd) UCL					1034

	A	B	C	D	E	F	G	H	I	J	K	L
849	97.5% Chebyshev(Mean, Sd) UCL					1245	99% Chebyshev(Mean, Sd) UCL					1660
850												
851	<b>Suggested UCL to Use</b>											
852	95% Adjusted Gamma UCL					813						
853												
854	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
855	Recommendations are based upon data size, data distribution, and skewness.											
856	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
857	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
858												
859												
860	<b>Mercury</b>											
861												
862	<b>General Statistics</b>											
863	Total Number of Observations					10	Number of Distinct Observations					9
864							Number of Missing Observations					0
865	Minimum					0.009	Mean					0.233
866	Maximum					0.457	Median					0.22
867	SD					0.165	Std. Error of Mean					0.0521
868	Coefficient of Variation					0.707	Skewness					0.0202
869												
870	<b>Normal GOF Test</b>											
871	Shapiro Wilk Test Statistic					0.926	<b>Shapiro Wilk GOF Test</b>					
872	5% Shapiro Wilk Critical Value					0.842	Data appear Normal at 5% Significance Level					
873	Lilliefors Test Statistic					0.142	<b>Lilliefors GOF Test</b>					
874	5% Lilliefors Critical Value					0.262	Data appear Normal at 5% Significance Level					
875	<b>Data appear Normal at 5% Significance Level</b>											
876												
877	<b>Assuming Normal Distribution</b>											
878	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
879	95% Student's-t UCL					0.329	95% Adjusted-CLT UCL (Chen-1995)					0.319
880							95% Modified-t UCL (Johnson-1978)					0.329
881												
882	<b>Gamma GOF Test</b>											
883	A-D Test Statistic					0.54	<b>Anderson-Darling Gamma GOF Test</b>					
884	5% A-D Critical Value					0.745	Detected data appear Gamma Distributed at 5% Significance Level					
885	K-S Test Statistic					0.2	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
886	5% K-S Critical Value					0.273	Detected data appear Gamma Distributed at 5% Significance Level					
887	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
888												
889	<b>Gamma Statistics</b>											
890	k hat (MLE)					1.163	k star (bias corrected MLE)					0.881
891	Theta hat (MLE)					0.2	Theta star (bias corrected MLE)					0.265
892	nu hat (MLE)					23.26	nu star (bias corrected)					17.61
893	MLE Mean (bias corrected)					0.233	MLE Sd (bias corrected)					0.248
894							Approximate Chi Square Value (0.05)					9.112
895	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					8.071
896												
897	<b>Assuming Gamma Distribution</b>											
898	95% Approximate Gamma UCL (use when n>=50))					0.451	95% Adjusted Gamma UCL (use when n<50)					0.509
899												
900	<b>Lognormal GOF Test</b>											
901	Shapiro Wilk Test Statistic					0.817	<b>Shapiro Wilk Lognormal GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
902	5% Shapiro Wilk Critical Value					0.842	Data Not Lognormal at 5% Significance Level					
903	Lilliefors Test Statistic					0.248	Lilliefors Lognormal GOF Test					
904	5% Lilliefors Critical Value					0.262	Data appear Lognormal at 5% Significance Level					
905	Data appear Approximate Lognormal at 5% Significance Level											
906												
907	Lognormal Statistics											
908	Minimum of Logged Data					-4.711	Mean of logged Data					-1.944
909	Maximum of Logged Data					-0.783	SD of logged Data					1.335
910												
911	Assuming Lognormal Distribution											
912	95% H-UCL					1.919	90% Chebyshev (MVUE) UCL					0.71
913	95% Chebyshev (MVUE) UCL					0.894	97.5% Chebyshev (MVUE) UCL					1.15
914	99% Chebyshev (MVUE) UCL					1.652						
915												
916	Nonparametric Distribution Free UCL Statistics											
917	Data appear to follow a Discernible Distribution at 5% Significance Level											
918												
919	Nonparametric Distribution Free UCLs											
920	95% CLT UCL					0.319	95% Jackknife UCL					0.329
921	95% Standard Bootstrap UCL					0.316	95% Bootstrap-t UCL					0.331
922	95% Hall's Bootstrap UCL					0.315	95% Percentile Bootstrap UCL					0.31
923	95% BCA Bootstrap UCL					0.313						
924	90% Chebyshev(Mean, Sd) UCL					0.389	95% Chebyshev(Mean, Sd) UCL					0.46
925	97.5% Chebyshev(Mean, Sd) UCL					0.558	99% Chebyshev(Mean, Sd) UCL					0.752
926												
927	Suggested UCL to Use											
928	95% Student's-t UCL					0.329						
929												
930	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
931	Recommendations are based upon data size, data distribution, and skewness.											
932	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
933	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
934												
935	Thallium											
936												
937	General Statistics											
938	Total Number of Observations					5	Number of Distinct Observations					5
939	Number of Detects					1	Number of Non-Detects					4
940	Number of Distinct Detects					1	Number of Distinct Non-Detects					4
941												
942	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
943	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
944												
945	The data set for variable Thallium was not processed!											
946												
947												
948												
949	Zinc											
950												
951	General Statistics											
952	Total Number of Observations					19	Number of Distinct Observations					18
953							Number of Missing Observations					0
954	Minimum					22	Mean					109.3

	A	B	C	D	E	F	G	H	I	J	K	L	
955					Maximum	284					Median	83.4	
956					SD	64.76					Std. Error of Mean	14.86	
957					Coefficient of Variation	0.592					Skewness	1.32	
958													
959	<b>Normal GOF Test</b>												
960					Shapiro Wilk Test Statistic	0.884					<b>Shapiro Wilk GOF Test</b>		
961					5% Shapiro Wilk Critical Value	0.901					Data Not Normal at 5% Significance Level		
962					Lilliefors Test Statistic	0.192					<b>Lilliefors GOF Test</b>		
963					5% Lilliefors Critical Value	0.197					Data appear Normal at 5% Significance Level		
964	<b>Data appear Approximate Normal at 5% Significance Level</b>												
965													
966	<b>Assuming Normal Distribution</b>												
967					<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>		
968					95% Student's-t UCL	135.1					95% Adjusted-CLT UCL (Chen-1995)	138.6	
969											95% Modified-t UCL (Johnson-1978)	135.8	
970													
971	<b>Gamma GOF Test</b>												
972					A-D Test Statistic	0.381					<b>Anderson-Darling Gamma GOF Test</b>		
973					5% A-D Critical Value	0.747					Detected data appear Gamma Distributed at 5% Significance Level		
974					K-S Test Statistic	0.136					<b>Kolmogorov-Smirnov Gamma GOF Test</b>		
975					5% K-S Critical Value	0.2					Detected data appear Gamma Distributed at 5% Significance Level		
976	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
977													
978	<b>Gamma Statistics</b>												
979					k hat (MLE)	3.272					k star (bias corrected MLE)	2.791	
980					Theta hat (MLE)	33.41					Theta star (bias corrected MLE)	39.18	
981					nu hat (MLE)	124.3					nu star (bias corrected)	106	
982					MLE Mean (bias corrected)	109.3					MLE Sd (bias corrected)	65.45	
983											Approximate Chi Square Value (0.05)	83.28	
984					Adjusted Level of Significance	0.0369					Adjusted Chi Square Value	81.52	
985													
986	<b>Assuming Gamma Distribution</b>												
987					95% Approximate Gamma UCL (use when n>=50))	139.2					95% Adjusted Gamma UCL (use when n<50)	142.2	
988													
989	<b>Lognormal GOF Test</b>												
990					Shapiro Wilk Test Statistic	0.965					<b>Shapiro Wilk Lognormal GOF Test</b>		
991					5% Shapiro Wilk Critical Value	0.901					Data appear Lognormal at 5% Significance Level		
992					Lilliefors Test Statistic	0.154					<b>Lilliefors Lognormal GOF Test</b>		
993					5% Lilliefors Critical Value	0.197					Data appear Lognormal at 5% Significance Level		
994	<b>Data appear Lognormal at 5% Significance Level</b>												
995													
996	<b>Lognormal Statistics</b>												
997					Minimum of Logged Data	3.091					Mean of logged Data	4.534	
998					Maximum of Logged Data	5.649					SD of logged Data	0.6	
999													
1000	<b>Assuming Lognormal Distribution</b>												
1001					95% H-UCL	150.2					90% Chebyshev (MVUE) UCL	158	
1002					95% Chebyshev (MVUE) UCL	179.7					97.5% Chebyshev (MVUE) UCL	209.7	
1003					99% Chebyshev (MVUE) UCL	268.7							
1004													
1005	<b>Nonparametric Distribution Free UCL Statistics</b>												
1006	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
1007													

	A	B	C	D	E	F	G	H	I	J	K	L	
1008	<b>Nonparametric Distribution Free UCLs</b>												
1009	95% CLT UCL				133.8	95% Jackknife UCL				135.1			
1010	95% Standard Bootstrap UCL				133.4	95% Bootstrap-t UCL				142.4			
1011	95% Hall's Bootstrap UCL				146.4	95% Percentile Bootstrap UCL				134.3			
1012	95% BCA Bootstrap UCL				140.5								
1013	90% Chebyshev(Mean, Sd) UCL				153.9	95% Chebyshev(Mean, Sd) UCL				174.1			
1014	97.5% Chebyshev(Mean, Sd) UCL				202.1	99% Chebyshev(Mean, Sd) UCL				257.1			
1015													
1016	<b>Suggested UCL to Use</b>												
1017	95% Student's-t UCL				135.1								
1018													
1019	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test												
1020	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL												
1021													
1022	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1023	Recommendations are based upon data size, data distribution, and skewness.												
1024	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1025	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
1026													
1027	<b>Benzo(a)anthracene</b>												
1028													
1029	<b>General Statistics</b>												
1030	Total Number of Observations				20	Number of Distinct Observations				17			
1031	Number of Detects				17	Number of Non-Detects				3			
1032	Number of Distinct Detects				16	Number of Distinct Non-Detects				2			
1033	Minimum Detect				0.044	Minimum Non-Detect				0.28			
1034	Maximum Detect				2.5	Maximum Non-Detect				0.29			
1035	Variance Detects				0.326	Percent Non-Detects				15%			
1036	Mean Detects				0.462	SD Detects				0.571			
1037	Median Detects				0.28	CV Detects				1.237			
1038	Skewness Detects				3.129	Kurtosis Detects				11.24			
1039	Mean of Logged Detects				-1.24	SD of Logged Detects				0.978			
1040													
1041	<b>Normal GOF Test on Detects Only</b>												
1042	Shapiro Wilk Test Statistic				0.622	<b>Shapiro Wilk GOF Test</b>							
1043	5% Shapiro Wilk Critical Value				0.892	Detected Data Not Normal at 5% Significance Level							
1044	Lilliefors Test Statistic				0.242	<b>Lilliefors GOF Test</b>							
1045	5% Lilliefors Critical Value				0.207	Detected Data Not Normal at 5% Significance Level							
1046	<b>Detected Data Not Normal at 5% Significance Level</b>												
1047													
1048	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
1049	KM Mean				0.414	KM Standard Error of Mean				0.121			
1050	KM SD				0.523	95% KM (BCA) UCL				0.642			
1051	95% KM (t) UCL				0.623	95% KM (Percentile Bootstrap) UCL				0.638			
1052	95% KM (z) UCL				0.613	95% KM Bootstrap t UCL				0.855			
1053	90% KM Chebyshev UCL				0.777	95% KM Chebyshev UCL				0.941			
1054	97.5% KM Chebyshev UCL				1.169	99% KM Chebyshev UCL				1.617			
1055													
1056	<b>Gamma GOF Tests on Detected Observations Only</b>												
1057	A-D Test Statistic				0.437	<b>Anderson-Darling GOF Test</b>							
1058	5% A-D Critical Value				0.762	Detected data appear Gamma Distributed at 5% Significance Level							
1059	K-S Test Statistic				0.127	<b>Kolmogorov-Smirnov GOF</b>							
1060	5% K-S Critical Value				0.214	Detected data appear Gamma Distributed at 5% Significance Level							



	A	B	C	D	E	F	G	H	I	J	K	L
1061	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1062												
1063	<b>Gamma Statistics on Detected Data Only</b>											
1064	k hat (MLE)				1.212		k star (bias corrected MLE)				1.037	
1065	Theta hat (MLE)				0.381		Theta star (bias corrected MLE)				0.445	
1066	nu hat (MLE)				41.2		nu star (bias corrected)				35.26	
1067	Mean (detects)				0.462							
1068												
1069	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1070	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1071	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1072	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1073	This is especially true when the sample size is small.											
1074	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1075	Minimum				0.01		Mean				0.403	
1076	Maximum				2.5		Median				0.225	
1077	SD				0.543		CV				1.349	
1078	k hat (MLE)				0.955		k star (bias corrected MLE)				0.845	
1079	Theta hat (MLE)				0.422		Theta star (bias corrected MLE)				0.477	
1080	nu hat (MLE)				38.2		nu star (bias corrected)				33.8	
1081	Adjusted Level of Significance ( $\beta$ )				0.038							
1082	Approximate Chi Square Value (33.80, $\alpha$ )				21.51		Adjusted Chi Square Value (33.80, $\beta$ )				20.73	
1083	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.633		95% Gamma Adjusted UCL (use when $n < 50$ )				0.657	
1084												
1085	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1086	Mean (KM)				0.414		SD (KM)				0.523	
1087	Variance (KM)				0.274		SE of Mean (KM)				0.121	
1088	k hat (KM)				0.627		k star (KM)				0.566	
1089	nu hat (KM)				25.06		nu star (KM)				22.64	
1090	theta hat (KM)				0.661		theta star (KM)				0.732	
1091	80% gamma percentile (KM)				0.683		90% gamma percentile (KM)				1.092	
1092	95% gamma percentile (KM)				1.523		99% gamma percentile (KM)				2.57	
1093												
1094	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1095	Approximate Chi Square Value (22.64, $\alpha$ )				12.82		Adjusted Chi Square Value (22.64, $\beta$ )				12.24	
1096	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.732		95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.767	
1097												
1098	<b>Lognormal GOF Test on Detected Observations Only</b>											
1099	Shapiro Wilk Test Statistic				0.981		<b>Shapiro Wilk GOF Test</b>					
1100	5% Shapiro Wilk Critical Value				0.892		Detected Data appear Lognormal at 5% Significance Level					
1101	Lilliefors Test Statistic				0.103		<b>Lilliefors GOF Test</b>					
1102	5% Lilliefors Critical Value				0.207		Detected Data appear Lognormal at 5% Significance Level					
1103	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1104												
1105	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1106	Mean in Original Scale				0.413		Mean in Log Scale				-1.352	
1107	SD in Original Scale				0.537		SD in Log Scale				0.944	
1108	95% t UCL (assumes normality of ROS data)				0.621		95% Percentile Bootstrap UCL				0.635	
1109	95% BCA Bootstrap UCL				0.747		95% Bootstrap t UCL				0.9	
1110	95% H-UCL (Log ROS)				0.702							
1111												
1112	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1113	KM Mean (logged)				-1.359		KM Geo Mean				0.257	

	A	B	C	D	E	F	G	H	I	J	K	L
1114					KM SD (logged)	0.942					95% Critical H Value (KM-Log)	2.55
1115					KM Standard Error of Mean (logged)	0.224					95% H-UCL (KM -Log)	0.695
1116					KM SD (logged)	0.942					95% Critical H Value (KM-Log)	2.55
1117					KM Standard Error of Mean (logged)	0.224						
1118												
1119	<b>DL/2 Statistics</b>											
1120	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1121					Mean in Original Scale	0.414					Mean in Log Scale	-1.347
1122					SD in Original Scale	0.537					SD in Log Scale	0.935
1123					95% t UCL (Assumes normality)	0.621					95% H-Stat UCL	0.695
1124	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1125												
1126	<b>Nonparametric Distribution Free UCL Statistics</b>											
1127	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1128												
1129	<b>Suggested UCL to Use</b>											
1130					95% KM Adjusted Gamma UCL	0.767					95% GROS Adjusted Gamma UCL	0.657
1131												
1132	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1133	Recommendations are based upon data size, data distribution, and skewness.											
1134	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1135	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1136												
1137	<b>Benzo(b)fluoranthene</b>											
1138												
1139	<b>General Statistics</b>											
1140					Total Number of Observations	20					Number of Distinct Observations	19
1141					Number of Detects	17					Number of Non-Detects	3
1142					Number of Distinct Detects	17					Number of Distinct Non-Detects	2
1143					Minimum Detect	0.05					Minimum Non-Detect	0.28
1144					Maximum Detect	2.3					Maximum Non-Detect	0.29
1145					Variance Detects	0.262					Percent Non-Detects	15%
1146					Mean Detects	0.508					SD Detects	0.512
1147					Median Detects	0.44					CV Detects	1.007
1148					Skewness Detects	2.897					Kurtosis Detects	10.24
1149					Mean of Logged Detects	-1.045					SD of Logged Detects	0.921
1150												
1151	<b>Normal GOF Test on Detects Only</b>											
1152					Shapiro Wilk Test Statistic	0.679					<b>Shapiro Wilk GOF Test</b>	
1153					5% Shapiro Wilk Critical Value	0.892					Detected Data Not Normal at 5% Significance Level	
1154					Lilliefors Test Statistic	0.247					<b>Lilliefors GOF Test</b>	
1155					5% Lilliefors Critical Value	0.207					Detected Data Not Normal at 5% Significance Level	
1156	<b>Detected Data Not Normal at 5% Significance Level</b>											
1157												
1158	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1159					KM Mean	0.455					KM Standard Error of Mean	0.11
1160					KM SD	0.475					95% KM (BCA) UCL	0.659
1161					95% KM (t) UCL	0.645					95% KM (Percentile Bootstrap) UCL	0.641
1162					95% KM (z) UCL	0.636					95% KM Bootstrap t UCL	0.812
1163					90% KM Chebyshev UCL	0.784					95% KM Chebyshev UCL	0.934
1164					97.5% KM Chebyshev UCL	1.141					99% KM Chebyshev UCL	1.548
1165												
1166	<b>Gamma GOF Tests on Detected Observations Only</b>											

	A	B	C	D	E	F	G	H	I	J	K	L	
1167	A-D Test Statistic				0.39	<b>Anderson-Darling GOF Test</b>							
1168	5% A-D Critical Value				0.756	Detected data appear Gamma Distributed at 5% Significance Level							
1169	K-S Test Statistic				0.151	<b>Kolmogorov-Smirnov GOF</b>							
1170	5% K-S Critical Value				0.213	Detected data appear Gamma Distributed at 5% Significance Level							
1171	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
1172													
1173	<b>Gamma Statistics on Detected Data Only</b>												
1174	k hat (MLE)				1.506	k star (bias corrected MLE)				1.279			
1175	Theta hat (MLE)				0.337	Theta star (bias corrected MLE)				0.397			
1176	nu hat (MLE)				51.2	nu star (bias corrected)				43.49			
1177	Mean (detects)				0.508								
1178													
1179	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
1180	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1181	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1182	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1183	This is especially true when the sample size is small.												
1184	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1185	Minimum				0.01	Mean				0.443			
1186	Maximum				2.3	Median				0.355			
1187	SD				0.496	CV				1.121			
1188	k hat (MLE)				1.072	k star (bias corrected MLE)				0.945			
1189	Theta hat (MLE)				0.413	Theta star (bias corrected MLE)				0.468			
1190	nu hat (MLE)				42.9	nu star (bias corrected)				37.8			
1191	Adjusted Level of Significance ( $\beta$ )				0.038								
1192	Approximate Chi Square Value (37.80, $\alpha$ )				24.72	Adjusted Chi Square Value (37.80, $\beta$ )				23.88			
1193	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.677	95% Gamma Adjusted UCL (use when $n < 50$ )				0.701			
1194													
1195	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1196	Mean (KM)				0.455	SD (KM)				0.475			
1197	Variance (KM)				0.226	SE of Mean (KM)				0.11			
1198	k hat (KM)				0.915	k star (KM)				0.811			
1199	nu hat (KM)				36.59	nu star (KM)				32.43			
1200	theta hat (KM)				0.497	theta star (KM)				0.561			
1201	80% gamma percentile (KM)				0.743	90% gamma percentile (KM)				1.102			
1202	95% gamma percentile (KM)				1.468	99% gamma percentile (KM)				2.331			
1203													
1204	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1205	Approximate Chi Square Value (32.43, $\alpha$ )				20.42	Adjusted Chi Square Value (32.43, $\beta$ )				19.66			
1206	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.722	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.75			
1207													
1208	<b>Lognormal GOF Test on Detected Observations Only</b>												
1209	Shapiro Wilk Test Statistic				0.955	<b>Shapiro Wilk GOF Test</b>							
1210	5% Shapiro Wilk Critical Value				0.892	Detected Data appear Lognormal at 5% Significance Level							
1211	Lilliefors Test Statistic				0.144	<b>Lilliefors GOF Test</b>							
1212	5% Lilliefors Critical Value				0.207	Detected Data appear Lognormal at 5% Significance Level							
1213	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
1214													
1215	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1216	Mean in Original Scale				0.453	Mean in Log Scale				-1.185			
1217	SD in Original Scale				0.488	SD in Log Scale				0.916			
1218	95% t UCL (assumes normality of ROS data)				0.642	95% Percentile Bootstrap UCL				0.646			
1219	95% BCA Bootstrap UCL				0.736	95% Bootstrap t UCL				0.814			

	A	B	C	D	E	F	G	H	I	J	K	L	
1220	95% H-UCL (Log ROS)					0.788							
1221													
1222	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1223	KM Mean (logged)				-1.191	KM Geo Mean				0.304			
1224	KM SD (logged)				0.923	95% Critical H Value (KM-Log)				2.524			
1225	KM Standard Error of Mean (logged)				0.222	95% H-UCL (KM -Log)				0.794			
1226	KM SD (logged)				0.923	95% Critical H Value (KM-Log)				2.524			
1227	KM Standard Error of Mean (logged)				0.222								
1228													
1229	<b>DL/2 Statistics</b>												
1230	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>							
1231	Mean in Original Scale				0.453	Mean in Log Scale				-1.181			
1232	SD in Original Scale				0.488	SD in Log Scale				0.909			
1233	95% t UCL (Assumes normality)				0.642	95% H-Stat UCL				0.781			
1234	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
1235													
1236	<b>Nonparametric Distribution Free UCL Statistics</b>												
1237	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>												
1238													
1239	<b>Suggested UCL to Use</b>												
1240	95% KM Adjusted Gamma UCL				0.75	95% GROS Adjusted Gamma UCL				0.701			
1241													
1242	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1243	Recommendations are based upon data size, data distribution, and skewness.												
1244	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1245	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
1246													
1247	<b>Benzo(k)fluoranthene</b>												
1248													
1249	<b>General Statistics</b>												
1250	Total Number of Observations				18	Number of Distinct Observations				17			
1251	Number of Detects				15	Number of Non-Detects				3			
1252	Number of Distinct Detects				15	Number of Distinct Non-Detects				2			
1253	Minimum Detect				0.038	Minimum Non-Detect				0.28			
1254	Maximum Detect				1.5	Maximum Non-Detect				0.29			
1255	Variance Detects				0.142	Percent Non-Detects				16.67%			
1256	Mean Detects				0.437	SD Detects				0.376			
1257	Median Detects				0.488	CV Detects				0.862			
1258	Skewness Detects				1.668	Kurtosis Detects				3.779			
1259	Mean of Logged Detects				-1.21	SD of Logged Detects				0.989			
1260													
1261	<b>Normal GOF Test on Detects Only</b>												
1262	Shapiro Wilk Test Statistic				0.834	<b>Shapiro Wilk GOF Test</b>							
1263	5% Shapiro Wilk Critical Value				0.881	Detected Data Not Normal at 5% Significance Level							
1264	Lilliefors Test Statistic				0.218	<b>Lilliefors GOF Test</b>							
1265	5% Lilliefors Critical Value				0.22	Detected Data appear Normal at 5% Significance Level							
1266	<b>Detected Data appear Approximate Normal at 5% Significance Level</b>												
1267													
1268	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
1269	KM Mean				0.388	KM Standard Error of Mean				0.0859			
1270	KM SD				0.35	95% KM (BCA) UCL				0.542			
1271	95% KM (t) UCL				0.538	95% KM (Percentile Bootstrap) UCL				0.535			
1272	95% KM (z) UCL				0.53	95% KM Bootstrap t UCL				0.607			

	A	B	C	D	E	F	G	H	I	J	K	L
1273	90% KM Chebyshev UCL					0.646	95% KM Chebyshev UCL					0.763
1274	97.5% KM Chebyshev UCL					0.925	99% KM Chebyshev UCL					1.243
1275												
1276	<b>Gamma GOF Tests on Detected Observations Only</b>											
1277	A-D Test Statistic					0.358	<b>Anderson-Darling GOF Test</b>					
1278	5% A-D Critical Value					0.755	Detected data appear Gamma Distributed at 5% Significance Level					
1279	K-S Test Statistic					0.194	<b>Kolmogorov-Smirnov GOF</b>					
1280	5% K-S Critical Value					0.226	Detected data appear Gamma Distributed at 5% Significance Level					
1281	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1282												
1283	<b>Gamma Statistics on Detected Data Only</b>											
1284	k hat (MLE)					1.455	k star (bias corrected MLE)					1.209
1285	Theta hat (MLE)					0.3	Theta star (bias corrected MLE)					0.361
1286	nu hat (MLE)					43.65	nu star (bias corrected)					36.26
1287	Mean (detects)					0.437						
1288												
1289	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1290	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1291	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1292	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1293	This is especially true when the sample size is small.											
1294	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1295	Minimum					0.038	Mean					0.386
1296	Maximum					1.5	Median					0.235
1297	SD					0.362	CV					0.938
1298	k hat (MLE)					1.362	k star (bias corrected MLE)					1.172
1299	Theta hat (MLE)					0.283	Theta star (bias corrected MLE)					0.329
1300	nu hat (MLE)					49.04	nu star (bias corrected)					42.2
1301	Adjusted Level of Significance ( $\beta$ )					0.0357						
1302	Approximate Chi Square Value (42.20, $\alpha$ )					28.31	Adjusted Chi Square Value (42.20, $\beta$ )					27.22
1303	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.575	95% Gamma Adjusted UCL (use when $n < 50$ )					0.598
1304												
1305	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1306	Mean (KM)					0.388	SD (KM)					0.35
1307	Variance (KM)					0.123	SE of Mean (KM)					0.0859
1308	k hat (KM)					1.23	k star (KM)					1.062
1309	nu hat (KM)					44.27	nu star (KM)					38.22
1310	theta hat (KM)					0.316	theta star (KM)					0.366
1311	80% gamma percentile (KM)					0.622	90% gamma percentile (KM)					0.881
1312	95% gamma percentile (KM)					1.139	99% gamma percentile (KM)					1.735
1313												
1314	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1315	Approximate Chi Square Value (38.22, $\alpha$ )					25.06	Adjusted Chi Square Value (38.22, $\beta$ )					24.04
1316	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.592	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.617
1317												
1318	<b>Lognormal GOF Test on Detected Observations Only</b>											
1319	Shapiro Wilk Test Statistic					0.949	<b>Shapiro Wilk GOF Test</b>					
1320	5% Shapiro Wilk Critical Value					0.881	Detected Data appear Lognormal at 5% Significance Level					
1321	Lilliefors Test Statistic					0.224	<b>Lilliefors GOF Test</b>					
1322	5% Lilliefors Critical Value					0.22	Detected Data Not Lognormal at 5% Significance Level					
1323	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>											
1324												
1325	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1326	Mean in Original Scale				0.387	Mean in Log Scale				-1.343		
1327	SD in Original Scale				0.36	SD in Log Scale				0.954		
1328	95% t UCL (assumes normality of ROS data)				0.535	95% Percentile Bootstrap UCL				0.526		
1329	95% BCA Bootstrap UCL				0.576	95% Bootstrap t UCL				0.592		
1330	95% H-UCL (Log ROS)				0.745							
1331												
1332	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1333	KM Mean (logged)				-1.355	KM Geo Mean				0.258		
1334	KM SD (logged)				0.964	95% Critical H Value (KM-Log)				2.586		
1335	KM Standard Error of Mean (logged)				0.247	95% H-UCL (KM -Log)				0.752		
1336	KM SD (logged)				0.964	95% Critical H Value (KM-Log)				2.586		
1337	KM Standard Error of Mean (logged)				0.247							
1338												
1339	<b>DL/2 Statistics</b>											
1340	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1341	Mean in Original Scale				0.387	Mean in Log Scale				-1.334		
1342	SD in Original Scale				0.36	SD in Log Scale				0.941		
1343	95% t UCL (Assumes normality)				0.535	95% H-Stat UCL				0.735		
1344	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1345												
1346	<b>Nonparametric Distribution Free UCL Statistics</b>											
1347	<b>Detected Data appear Approximate Normal Distributed at 5% Significance Level</b>											
1348												
1349	<b>Suggested UCL to Use</b>											
1350	95% KM (t) UCL				0.538							
1351												
1352	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1353	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1354												
1355	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1356	Recommendations are based upon data size, data distribution, and skewness.											
1357	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1358	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1359												
1360	<b>Benzo(a)pyrene</b>											
1361												
1362	<b>General Statistics</b>											
1363	Total Number of Observations				19	Number of Distinct Observations				16		
1364	Number of Detects				16	Number of Non-Detects				3		
1365	Number of Distinct Detects				15	Number of Distinct Non-Detects				2		
1366	Minimum Detect				0.038	Minimum Non-Detect				0.28		
1367	Maximum Detect				0.643	Maximum Non-Detect				0.29		
1368	Variance Detects				0.0411	Percent Non-Detects				15.79%		
1369	Mean Detects				0.294	SD Detects				0.203		
1370	Median Detects				0.265	CV Detects				0.688		
1371	Skewness Detects				0.54	Kurtosis Detects				-1.036		
1372	Mean of Logged Detects				-1.506	SD of Logged Detects				0.848		
1373												
1374	<b>Normal GOF Test on Detects Only</b>											
1375	Shapiro Wilk Test Statistic				0.914	<b>Shapiro Wilk GOF Test</b>						
1376	5% Shapiro Wilk Critical Value				0.887	Detected Data appear Normal at 5% Significance Level						
1377	Lilliefors Test Statistic				0.151	<b>Lilliefors GOF Test</b>						
1378	5% Lilliefors Critical Value				0.213	Detected Data appear Normal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L	
1379	<b>Detected Data appear Normal at 5% Significance Level</b>												
1380													
1381	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
1382	KM Mean				0.271	KM Standard Error of Mean				0.0459			
1383	KM SD				0.19	95% KM (BCA) UCL				0.343			
1384	95% KM (t) UCL				0.351	95% KM (Percentile Bootstrap) UCL				0.344			
1385	95% KM (z) UCL				0.347	95% KM Bootstrap t UCL				0.359			
1386	90% KM Chebyshev UCL				0.409	95% KM Chebyshev UCL				0.471			
1387	97.5% KM Chebyshev UCL				0.558	99% KM Chebyshev UCL				0.728			
1388													
1389	<b>Gamma GOF Tests on Detected Observations Only</b>												
1390	A-D Test Statistic				0.245	<b>Anderson-Darling GOF Test</b>							
1391	5% A-D Critical Value				0.751	Detected data appear Gamma Distributed at 5% Significance Level							
1392	K-S Test Statistic				0.114	<b>Kolmogorov-Smirnov GOF</b>							
1393	5% K-S Critical Value				0.218	Detected data appear Gamma Distributed at 5% Significance Level							
1394	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
1395													
1396	<b>Gamma Statistics on Detected Data Only</b>												
1397	k hat (MLE)				1.916	k star (bias corrected MLE)				1.599			
1398	Theta hat (MLE)				0.154	Theta star (bias corrected MLE)				0.184			
1399	nu hat (MLE)				61.32	nu star (bias corrected)				51.16			
1400	Mean (detects)				0.294								
1401													
1402	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
1403	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1404	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1405	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1406	This is especially true when the sample size is small.												
1407	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1408	Minimum				0.038	Mean				0.271			
1409	Maximum				0.643	Median				0.193			
1410	SD				0.194	CV				0.714			
1411	k hat (MLE)				2	k star (bias corrected MLE)				1.719			
1412	Theta hat (MLE)				0.136	Theta star (bias corrected MLE)				0.158			
1413	nu hat (MLE)				76.01	nu star (bias corrected)				65.34			
1414	Adjusted Level of Significance ( $\beta$ )				0.0369								
1415	Approximate Chi Square Value (65.34, $\alpha$ )				47.74	Adjusted Chi Square Value (65.34, $\beta$ )				46.42			
1416	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.371	95% Gamma Adjusted UCL (use when $n < 50$ )				0.382			
1417													
1418	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1419	Mean (KM)				0.271	SD (KM)				0.19			
1420	Variance (KM)				0.0363	SE of Mean (KM)				0.0459			
1421	k hat (KM)				2.026	k star (KM)				1.741			
1422	nu hat (KM)				77	nu star (KM)				66.17			
1423	theta hat (KM)				0.134	theta star (KM)				0.156			
1424	80% gamma percentile (KM)				0.412	90% gamma percentile (KM)				0.545			
1425	95% gamma percentile (KM)				0.672	99% gamma percentile (KM)				0.957			
1426													
1427	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1428	Approximate Chi Square Value (66.17, $\alpha$ )				48.45	Adjusted Chi Square Value (66.17, $\beta$ )				47.13			
1429	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.37	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.381			
1430													
1431	<b>Lognormal GOF Test on Detected Observations Only</b>												

	A	B	C	D	E	F	G	H	I	J	K	L
1432	Shapiro Wilk Test Statistic					0.945	Shapiro Wilk GOF Test					
1433	5% Shapiro Wilk Critical Value					0.887	Detected Data appear Lognormal at 5% Significance Level					
1434	Lilliefors Test Statistic					0.137	Lilliefors GOF Test					
1435	5% Lilliefors Critical Value					0.213	Detected Data appear Lognormal at 5% Significance Level					
1436	Detected Data appear Lognormal at 5% Significance Level											
1437												
1438	Lognormal ROS Statistics Using Imputed Non-Detects											
1439	Mean in Original Scale					0.269	Mean in Log Scale					-1.593
1440	SD in Original Scale					0.195	SD in Log Scale					0.806
1441	95% t UCL (assumes normality of ROS data)					0.346	95% Percentile Bootstrap UCL					0.338
1442	95% BCA Bootstrap UCL					0.347	95% Bootstrap t UCL					0.358
1443	95% H-UCL (Log ROS)					0.44						
1444												
1445	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1446	KM Mean (logged)					-1.597	KM Geo Mean					0.203
1447	KM SD (logged)					0.819	95% Critical H Value (KM-Log)					2.366
1448	KM Standard Error of Mean (logged)					0.205	95% H-UCL (KM -Log)					0.447
1449	KM SD (logged)					0.819	95% Critical H Value (KM-Log)					2.366
1450	KM Standard Error of Mean (logged)					0.205						
1451												
1452	DL/2 Statistics											
1453	DL/2 Normal					DL/2 Log-Transformed						
1454	Mean in Original Scale					0.27	Mean in Log Scale					-1.577
1455	SD in Original Scale					0.194	SD in Log Scale					0.792
1456	95% t UCL (Assumes normality)					0.347	95% H-Stat UCL					0.437
1457	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1458												
1459	Nonparametric Distribution Free UCL Statistics											
1460	Detected Data appear Normal Distributed at 5% Significance Level											
1461												
1462	Suggested UCL to Use											
1463	95% KM (t) UCL					0.351						
1464												
1465	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1466	Recommendations are based upon data size, data distribution, and skewness.											
1467	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1468	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1469												
1470	Chrysene											
1471												
1472	General Statistics											
1473	Total Number of Observations					20	Number of Distinct Observations					18
1474	Number of Detects					17	Number of Non-Detects					3
1475	Number of Distinct Detects					17	Number of Distinct Non-Detects					2
1476	Minimum Detect					0.049	Minimum Non-Detect					0.28
1477	Maximum Detect					2.7	Maximum Non-Detect					0.29
1478	Variance Detects					0.373	Percent Non-Detects					15%
1479	Mean Detects					0.518	SD Detects					0.611
1480	Median Detects					0.36	CV Detects					1.181
1481	Skewness Detects					3.128	Kurtosis Detects					11.26
1482	Mean of Logged Detects					-1.084	SD of Logged Detects					0.94
1483												
1484	Normal GOF Test on Detects Only											



	A	B	C	D	E	F	G	H	I	J	K	L
1485	Shapiro Wilk Test Statistic					0.627	Shapiro Wilk GOF Test					
1486	5% Shapiro Wilk Critical Value					0.892	Detected Data Not Normal at 5% Significance Level					
1487	Lilliefors Test Statistic					0.263	Lilliefors GOF Test					
1488	5% Lilliefors Critical Value					0.207	Detected Data Not Normal at 5% Significance Level					
1489	Detected Data Not Normal at 5% Significance Level											
1490												
1491	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1492	KM Mean					0.464	KM Standard Error of Mean					0.13
1493	KM SD					0.562	95% KM (BCA) UCL					0.705
1494	95% KM (t) UCL					0.689	95% KM (Percentile Bootstrap) UCL					0.698
1495	95% KM (z) UCL					0.678	95% KM Bootstrap t UCL					0.938
1496	90% KM Chebyshev UCL					0.853	95% KM Chebyshev UCL					1.029
1497	97.5% KM Chebyshev UCL					1.274	99% KM Chebyshev UCL					1.754
1498												
1499	Gamma GOF Tests on Detected Observations Only											
1500	A-D Test Statistic					0.422	Anderson-Darling GOF Test					
1501	5% A-D Critical Value					0.759	Detected data appear Gamma Distributed at 5% Significance Level					
1502	K-S Test Statistic					0.147	Kolmogorov-Smirnov GOF					
1503	5% K-S Critical Value					0.214	Detected data appear Gamma Distributed at 5% Significance Level					
1504	Detected data appear Gamma Distributed at 5% Significance Level											
1505												
1506	Gamma Statistics on Detected Data Only											
1507	k hat (MLE)					1.316	k star (bias corrected MLE)					1.123
1508	Theta hat (MLE)					0.393	Theta star (bias corrected MLE)					0.461
1509	nu hat (MLE)					44.74	nu star (bias corrected)					38.18
1510	Mean (detects)					0.518						
1511												
1512	Gamma ROS Statistics using Imputed Non-Detects											
1513	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1514	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1515	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1516	This is especially true when the sample size is small.											
1517	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1518	Minimum					0.01	Mean					0.45
1519	Maximum					2.7	Median					0.26
1520	SD					0.585	CV					1.299
1521	k hat (MLE)					0.98	k star (bias corrected MLE)					0.866
1522	Theta hat (MLE)					0.459	Theta star (bias corrected MLE)					0.52
1523	nu hat (MLE)					39.2	nu star (bias corrected)					34.65
1524	Adjusted Level of Significance ( $\beta$ )					0.038						
1525	Approximate Chi Square Value (34.65, $\alpha$ )					22.19	Adjusted Chi Square Value (34.65, $\beta$ )					21.4
1526	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.703	95% Gamma Adjusted UCL (use when $n < 50$ )					0.729
1527												
1528	Estimates of Gamma Parameters using KM Estimates											
1529	Mean (KM)					0.464	SD (KM)					0.562
1530	Variance (KM)					0.315	SE of Mean (KM)					0.13
1531	k hat (KM)					0.684	k star (KM)					0.615
1532	nu hat (KM)					27.36	nu star (KM)					24.59
1533	theta hat (KM)					0.679	theta star (KM)					0.755
1534	80% gamma percentile (KM)					0.765	90% gamma percentile (KM)					1.201
1535	95% gamma percentile (KM)					1.657	99% gamma percentile (KM)					2.756
1536												
1537	Gamma Kaplan-Meier (KM) Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
1538	Approximate Chi Square Value (24.59, $\alpha$ )					14.3	Adjusted Chi Square Value (24.59, $\beta$ )					13.68
1539	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.799	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.835
1540												
1541	<b>Lognormal GOF Test on Detected Observations Only</b>											
1542	Shapiro Wilk Test Statistic					0.98	<b>Shapiro Wilk GOF Test</b>					
1543	5% Shapiro Wilk Critical Value					0.892	Detected Data appear Lognormal at 5% Significance Level					
1544	Lilliefors Test Statistic					0.121	<b>Lilliefors GOF Test</b>					
1545	5% Lilliefors Critical Value					0.207	Detected Data appear Lognormal at 5% Significance Level					
1546	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1547												
1548	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1549	Mean in Original Scale					0.463	Mean in Log Scale					-1.207
1550	SD in Original Scale					0.577	SD in Log Scale					0.917
1551	95% t UCL (assumes normality of ROS data)					0.686	95% Percentile Bootstrap UCL					0.694
1552	95% BCA Bootstrap UCL					0.808	95% Bootstrap t UCL					0.942
1553	95% H-UCL (Log ROS)					0.774						
1554												
1555	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1556	KM Mean (logged)					-1.21	KM Geo Mean					0.298
1557	KM SD (logged)					0.915	95% Critical H Value (KM-Log)					2.513
1558	KM Standard Error of Mean (logged)					0.218	95% H-UCL (KM -Log)					0.768
1559	KM SD (logged)					0.915	95% Critical H Value (KM-Log)					2.513
1560	KM Standard Error of Mean (logged)					0.218						
1561												
1562	<b>DL/2 Statistics</b>											
1563	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1564	Mean in Original Scale					0.461	Mean in Log Scale					-1.215
1565	SD in Original Scale					0.577	SD in Log Scale					0.919
1566	95% t UCL (Assumes normality)					0.684	95% H-Stat UCL					0.77
1567	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1568												
1569	<b>Nonparametric Distribution Free UCL Statistics</b>											
1570	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1571												
1572	<b>Suggested UCL to Use</b>											
1573	95% KM Adjusted Gamma UCL					0.835	95% GROS Adjusted Gamma UCL					0.729
1574												
1575	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1576	Recommendations are based upon data size, data distribution, and skewness.											
1577	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1578	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1579												
1580												
1581	<b>Dibenz(a,h)anthracene</b>											
1582												
1583	<b>General Statistics</b>											
1584	Total Number of Observations					3	Number of Distinct Observations					3
1585							Number of Missing Observations					0
1586	Minimum					0.051	Mean					0.184
1587	Maximum					0.39	Median					0.11
1588	SD					0.181	Std. Error of Mean					0.105
1589	Coefficient of Variation					0.986	Skewness					1.528
1590												

	A	B	C	D	E	F	G	H	I	J	K	L
1591	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1592	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1593	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1594	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1595												
1596	<b>Normal GOF Test</b>											
1597	Shapiro Wilk Test Statistic				0.876		<b>Shapiro Wilk GOF Test</b>					
1598	5% Shapiro Wilk Critical Value				0.767		Data appear Normal at 5% Significance Level					
1599	Lilliefors Test Statistic				0.325		<b>Lilliefors GOF Test</b>					
1600	5% Lilliefors Critical Value				0.425		Data appear Normal at 5% Significance Level					
1601	<b>Data appear Normal at 5% Significance Level</b>											
1602												
1603	<b>Assuming Normal Distribution</b>											
1604	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
1605	95% Student's-t UCL				0.489		95% Adjusted-CLT UCL (Chen-1995)				0.454	
1606							95% Modified-t UCL (Johnson-1978)				0.504	
1607												
1608	<b>Gamma GOF Test</b>											
1609	<b>Not Enough Data to Perform GOF Test</b>											
1610												
1611	<b>Gamma Statistics</b>											
1612	k hat (MLE)				1.587		k star (bias corrected MLE)				N/A	
1613	Theta hat (MLE)				0.116		Theta star (bias corrected MLE)				N/A	
1614	nu hat (MLE)				9.523		nu star (bias corrected)				N/A	
1615	MLE Mean (bias corrected)				N/A		MLE Sd (bias corrected)				N/A	
1616							Approximate Chi Square Value (0.05)				N/A	
1617	Adjusted Level of Significance				N/A		Adjusted Chi Square Value				N/A	
1618												
1619	<b>Assuming Gamma Distribution</b>											
1620	95% Approximate Gamma UCL (use when n>=50))				N/A		95% Adjusted Gamma UCL (use when n<50)				N/A	
1621												
1622	<b>Lognormal GOF Test</b>											
1623	Shapiro Wilk Test Statistic				0.98		<b>Shapiro Wilk Lognormal GOF Test</b>					
1624	5% Shapiro Wilk Critical Value				0.767		Data appear Lognormal at 5% Significance Level					
1625	Lilliefors Test Statistic				0.231		<b>Lilliefors Lognormal GOF Test</b>					
1626	5% Lilliefors Critical Value				0.425		Data appear Lognormal at 5% Significance Level					
1627	<b>Data appear Lognormal at 5% Significance Level</b>											
1628												
1629	<b>Lognormal Statistics</b>											
1630	Minimum of Logged Data				-2.976		Mean of logged Data				-2.042	
1631	Maximum of Logged Data				-0.942		SD of logged Data				1.027	
1632												
1633	<b>Assuming Lognormal Distribution</b>											
1634	95% H-UCL		3730		90% Chebyshev (MVUE) UCL				0.464			
1635	95% Chebyshev (MVUE) UCL		0.592		97.5% Chebyshev (MVUE) UCL				0.771			
1636	99% Chebyshev (MVUE) UCL		1.121									
1637												
1638	<b>Nonparametric Distribution Free UCL Statistics</b>											
1639	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
1640												
1641	<b>Nonparametric Distribution Free UCLs</b>											
1642	95% CLT UCL				0.356		95% Jackknife UCL				0.489	
1643	95% Standard Bootstrap UCL				N/A		95% Bootstrap-t UCL				N/A	

	A	B	C	D	E	F	G	H	I	J	K	L
1644	95% Hall's Bootstrap UCL					N/A	95% Percentile Bootstrap UCL					N/A
1645	95% BCA Bootstrap UCL					N/A						
1646	90% Chebyshev(Mean, Sd) UCL					0.497	95% Chebyshev(Mean, Sd) UCL					0.639
1647	97.5% Chebyshev(Mean, Sd) UCL					0.837	99% Chebyshev(Mean, Sd) UCL					1.224
1648												
1649	<b>Suggested UCL to Use</b>											
1650	95% Student's-t UCL					0.489						
1651												
1652	<b>Recommended UCL exceeds the maximum observation</b>											
1653												
1654	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1655	Recommendations are based upon data size, data distribution, and skewness.											
1656	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1657	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1658												
1659	<b>Indeno(1,2,3-cd)pyrene</b>											
1660												
1661	<b>General Statistics</b>											
1662	Total Number of Observations					19	Number of Distinct Observations					17
1663	Number of Detects					16	Number of Non-Detects					3
1664	Number of Distinct Detects					15	Number of Distinct Non-Detects					2
1665	Minimum Detect					0.037	Minimum Non-Detect					0.28
1666	Maximum Detect					0.74	Maximum Non-Detect					0.29
1667	Variance Detects					0.0371	Percent Non-Detects					15.79%
1668	Mean Detects					0.205	SD Detects					0.193
1669	Median Detects					0.135	CV Detects					0.939
1670	Skewness Detects					1.851	Kurtosis Detects					3.108
1671	Mean of Logged Detects					-1.915	SD of Logged Detects					0.819
1672												
1673	<b>Normal GOF Test on Detects Only</b>											
1674	Shapiro Wilk Test Statistic					0.761	<b>Shapiro Wilk GOF Test</b>					
1675	5% Shapiro Wilk Critical Value					0.887	Detected Data Not Normal at 5% Significance Level					
1676	Lilliefors Test Statistic					0.281	<b>Lilliefors GOF Test</b>					
1677	5% Lilliefors Critical Value					0.213	Detected Data Not Normal at 5% Significance Level					
1678	<b>Detected Data Not Normal at 5% Significance Level</b>											
1679												
1680	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1681	KM Mean					0.192	KM Standard Error of Mean					0.0419
1682	KM SD					0.175	95% KM (BCA) UCL					0.266
1683	95% KM (t) UCL					0.265	95% KM (Percentile Bootstrap) UCL					0.262
1684	95% KM (z) UCL					0.261	95% KM Bootstrap t UCL					0.314
1685	90% KM Chebyshev UCL					0.318	95% KM Chebyshev UCL					0.375
1686	97.5% KM Chebyshev UCL					0.454	99% KM Chebyshev UCL					0.61
1687												
1688	<b>Gamma GOF Tests on Detected Observations Only</b>											
1689	A-D Test Statistic					0.575	<b>Anderson-Darling GOF Test</b>					
1690	5% A-D Critical Value					0.753	Detected data appear Gamma Distributed at 5% Significance Level					
1691	K-S Test Statistic					0.184	<b>Kolmogorov-Smirnov GOF</b>					
1692	5% K-S Critical Value					0.219	Detected data appear Gamma Distributed at 5% Significance Level					
1693	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1694												
1695	<b>Gamma Statistics on Detected Data Only</b>											
1696	k hat (MLE)					1.656	k star (bias corrected MLE)					1.387

	A	B	C	D	E	F	G	H	I	J	K	L
1697					Theta hat (MLE)	0.124				Theta star (bias corrected MLE)		0.148
1698					nu hat (MLE)	52.99				nu star (bias corrected)		44.39
1699					Mean (detects)	0.205						
1700												
1701	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1702	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1703	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1704	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1705	This is especially true when the sample size is small.											
1706	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1707					Minimum	0.037				Mean		0.192
1708					Maximum	0.74				Median		0.13
1709					SD	0.179				CV		0.934
1710					k hat (MLE)	1.779				k star (bias corrected MLE)		1.533
1711					Theta hat (MLE)	0.108				Theta star (bias corrected MLE)		0.125
1712					nu hat (MLE)	67.6				nu star (bias corrected)		58.26
1713					Adjusted Level of Significance ( $\beta$ )	0.0369						
1714					Approximate Chi Square Value (58.26, $\alpha$ )	41.71				Adjusted Chi Square Value (58.26, $\beta$ )		40.49
1715					95% Gamma Approximate UCL (use when $n \geq 50$ )	0.268				95% Gamma Adjusted UCL (use when $n < 50$ )		0.277
1716												
1717	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1718					Mean (KM)	0.192				SD (KM)		0.175
1719					Variance (KM)	0.0307				SE of Mean (KM)		0.0419
1720					k hat (KM)	1.205				k star (KM)		1.049
1721					nu hat (KM)	45.77				nu star (KM)		39.88
1722					theta hat (KM)	0.16				theta star (KM)		0.183
1723					80% gamma percentile (KM)	0.308				90% gamma percentile (KM)		0.437
1724					95% gamma percentile (KM)	0.566				99% gamma percentile (KM)		0.864
1725												
1726	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1727					Approximate Chi Square Value (39.88, $\alpha$ )	26.41				Adjusted Chi Square Value (39.88, $\beta$ )		25.45
1728					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.29				95% Gamma Adjusted KM-UCL (use when $n < 50$ )		0.301
1729												
1730	<b>Lognormal GOF Test on Detected Observations Only</b>											
1731					Shapiro Wilk Test Statistic	0.966				<b>Shapiro Wilk GOF Test</b>		
1732					5% Shapiro Wilk Critical Value	0.887				Detected Data appear Lognormal at 5% Significance Level		
1733					Lilliefors Test Statistic	0.128				<b>Lilliefors GOF Test</b>		
1734					5% Lilliefors Critical Value	0.213				Detected Data appear Lognormal at 5% Significance Level		
1735	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1736												
1737	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1738					Mean in Original Scale	0.192				Mean in Log Scale		-1.952
1739					SD in Original Scale	0.179				SD in Log Scale		0.76
1740					95% t UCL (assumes normality of ROS data)	0.263				95% Percentile Bootstrap UCL		0.263
1741					95% BCA Bootstrap UCL	0.282				95% Bootstrap t UCL		0.334
1742					95% H-UCL (Log ROS)	0.286						
1743												
1744	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1745					KM Mean (logged)	-1.963				KM Geo Mean		0.14
1746					KM SD (logged)	0.765				95% Critical H Value (KM-Log)		2.299
1747					KM Standard Error of Mean (logged)	0.189				95% H-UCL (KM -Log)		0.285
1748					KM SD (logged)	0.765				95% Critical H Value (KM-Log)		2.299
1749					KM Standard Error of Mean (logged)	0.189						

	A	B	C	D	E	F	G	H	I	J	K	L		
1750														
1751	<b>DL/2 Statistics</b>													
1752	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>							
1753	Mean in Original Scale					0.195		Mean in Log Scale					-1.921	
1754	SD in Original Scale					0.177		SD in Log Scale					0.748	
1755	95% t UCL (Assumes normality)					0.266		95% H-Stat UCL					0.289	
1756	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>													
1757														
1758	<b>Nonparametric Distribution Free UCL Statistics</b>													
1759	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>													
1760														
1761	<b>Suggested UCL to Use</b>													
1762	95% KM Adjusted Gamma UCL					0.301		95% GROS Adjusted Gamma UCL					0.277	
1763														
1764	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.													
1765	Recommendations are based upon data size, data distribution, and skewness.													
1766	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).													
1767	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.													
1768														
1769	<b>PCB</b>													
1770														
1771	<b>General Statistics</b>													
1772	Total Number of Observations					5		Number of Distinct Observations					5	
1773	Number of Detects					1		Number of Non-Detects					4	
1774	Number of Distinct Detects					1		Number of Distinct Non-Detects					4	
1775														
1776	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>													
1777	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>													
1778														
1779	<b>The data set for variable PCB was not processed!</b>													
1780														
1781														

	A	B	C	D	E	F	G	H	I	J	K	L
1	<b>UCL Statistics for Data Sets with Non-Detects</b>											
2												
3	User Selected Options											
4	Date/Time of Computation		ProUCL 5.11/27/2020 11:33:26 AM									
5	From File		AreaC_CC_allsoil_prouclin.xls									
6	Full Precision		OFF									
7	Confidence Coefficient		95%									
8	Number of Bootstrap Operations		2000									
9												
10												
11	<b>Aluminum</b>											
12												
13	<b>General Statistics</b>											
14	Total Number of Observations				35		Number of Distinct Observations				33	
15							Number of Missing Observations				0	
16	Minimum				2180		Mean				6099	
17	Maximum				29900		Median				3990	
18	SD				5572		Std. Error of Mean				941.9	
19	Coefficient of Variation				0.914		Skewness				2.76	
20												
21	<b>Normal GOF Test</b>											
22	Shapiro Wilk Test Statistic				0.673		<b>Shapiro Wilk GOF Test</b>					
23	5% Shapiro Wilk Critical Value				0.934		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.241		<b>Lilliefors GOF Test</b>					
25	5% Lilliefors Critical Value				0.148		Data Not Normal at 5% Significance Level					
26	<b>Data Not Normal at 5% Significance Level</b>											
27												
28	<b>Assuming Normal Distribution</b>											
29	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
30	95% Student's-t UCL				7691		95% Adjusted-CLT UCL (Chen-1995)				8117	
31							95% Modified-t UCL (Johnson-1978)				7764	
32												
33	<b>Gamma GOF Test</b>											
34	A-D Test Statistic				1.739		<b>Anderson-Darling Gamma GOF Test</b>					
35	5% A-D Critical Value				0.759		Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.185		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
37	5% K-S Critical Value				0.151		Data Not Gamma Distributed at 5% Significance Level					
38	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
39												
40	<b>Gamma Statistics</b>											
41	k hat (MLE)				2.15		k star (bias corrected MLE)				1.984	
42	Theta hat (MLE)				2837		Theta star (bias corrected MLE)				3073	
43	nu hat (MLE)				150.5		nu star (bias corrected)				138.9	
44	MLE Mean (bias corrected)				6099		MLE Sd (bias corrected)				4329	
45							Approximate Chi Square Value (0.05)				112.7	
46	Adjusted Level of Significance				0.0425		Adjusted Chi Square Value				111.6	
47												
48	<b>Assuming Gamma Distribution</b>											
49	95% Approximate Gamma UCL (use when n>=50))				7518		95% Adjusted Gamma UCL (use when n<50)				7594	
50												
51	<b>Lognormal GOF Test</b>											
52	Shapiro Wilk Test Statistic				0.907		<b>Shapiro Wilk Lognormal GOF Test</b>					
53	5% Shapiro Wilk Critical Value				0.934		Data Not Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
54	Lilliefors Test Statistic				0.15	Lilliefors Lognormal GOF Test						
55	5% Lilliefors Critical Value				0.148	Data Not Lognormal at 5% Significance Level						
56	Data Not Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				7.687	Mean of logged Data				8.466		
60	Maximum of Logged Data				10.31	SD of logged Data				0.655		
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				7434	90% Chebyshev (MVUE) UCL				7932		
64	95% Chebyshev (MVUE) UCL				8878	97.5% Chebyshev (MVUE) UCL				10192		
65	99% Chebyshev (MVUE) UCL				12772							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data do not follow a Discernible Distribution (0.05)											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				7648	95% Jackknife UCL				7691		
72	95% Standard Bootstrap UCL				7632	95% Bootstrap-t UCL				8694		
73	95% Hall's Bootstrap UCL				9224	95% Percentile Bootstrap UCL				7782		
74	95% BCA Bootstrap UCL				8137							
75	90% Chebyshev(Mean, Sd) UCL				8924	95% Chebyshev(Mean, Sd) UCL				10204		
76	97.5% Chebyshev(Mean, Sd) UCL				11981	99% Chebyshev(Mean, Sd) UCL				15470		
77												
78	Suggested UCL to Use											
79	95% Chebyshev (Mean, Sd) UCL				10204							
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												
86	Antimony											
87												
88	General Statistics											
89	Total Number of Observations				17	Number of Distinct Observations				17		
90	Number of Detects				7	Number of Non-Detects				10		
91	Number of Distinct Detects				7	Number of Distinct Non-Detects				10		
92	Minimum Detect				6.4	Minimum Non-Detect				2.89		
93	Maximum Detect				11.4	Maximum Non-Detect				3.51		
94	Variance Detects				2.807	Percent Non-Detects				58.82%		
95	Mean Detects				8.9	SD Detects				1.675		
96	Median Detects				9.2	CV Detects				0.188		
97	Skewness Detects				-0.252	Kurtosis Detects				-0.117		
98	Mean of Logged Detects				2.17	SD of Logged Detects				0.197		
99												
100	Normal GOF Test on Detects Only											
101	Shapiro Wilk Test Statistic				0.938	Shapiro Wilk GOF Test						
102	5% Shapiro Wilk Critical Value				0.803	Detected Data appear Normal at 5% Significance Level						
103	Lilliefors Test Statistic				0.238	Lilliefors GOF Test						
104	5% Lilliefors Critical Value				0.304	Detected Data appear Normal at 5% Significance Level						
105	Detected Data appear Normal at 5% Significance Level											
106												



	A	B	C	D	E	F	G	H	I	J	K	L
107	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
108	KM Mean				5.365	KM Standard Error of Mean				0.818		
109	KM SD				3.121	95% KM (BCA) UCL				6.761		
110	95% KM (t) UCL				6.792	95% KM (Percentile Bootstrap) UCL				6.678		
111	95% KM (z) UCL				6.709	95% KM Bootstrap t UCL				6.523		
112	90% KM Chebyshev UCL				7.817	95% KM Chebyshev UCL				8.928		
113	97.5% KM Chebyshev UCL				10.47	99% KM Chebyshev UCL				13.5		
114												
115	<b>Gamma GOF Tests on Detected Observations Only</b>											
116	A-D Test Statistic				0.398	<b>Anderson-Darling GOF Test</b>						
117	5% A-D Critical Value				0.707	Detected data appear Gamma Distributed at 5% Significance Level						
118	K-S Test Statistic				0.263	<b>Kolmogorov-Smirnov GOF</b>						
119	5% K-S Critical Value				0.311	Detected data appear Gamma Distributed at 5% Significance Level						
120	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
121												
122	<b>Gamma Statistics on Detected Data Only</b>											
123	k hat (MLE)				31.27	k star (bias corrected MLE)				17.97		
124	Theta hat (MLE)				0.285	Theta star (bias corrected MLE)				0.495		
125	nu hat (MLE)				437.8	nu star (bias corrected)				251.5		
126	Mean (detects)				8.9							
127												
128	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
129	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
130	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
131	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
132	This is especially true when the sample size is small.											
133	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
134	Minimum				4.31	Mean				6.2		
135	Maximum				11.4	Median				4.31		
136	SD				2.545	CV				0.41		
137	k hat (MLE)				7.139	k star (bias corrected MLE)				5.919		
138	Theta hat (MLE)				0.868	Theta star (bias corrected MLE)				1.047		
139	nu hat (MLE)				242.7	nu star (bias corrected)				201.2		
140	Adjusted Level of Significance ( $\beta$ )				0.0346							
141	Approximate Chi Square Value (201.24, $\alpha$ )				169.4	Adjusted Chi Square Value (201.24, $\beta$ )				166.4		
142	95% Gamma Approximate UCL (use when $n \geq 50$ )				7.364	95% Gamma Adjusted UCL (use when $n < 50$ )				7.5		
143												
144	<b>Estimates of Gamma Parameters using KM Estimates</b>											
145	Mean (KM)				5.365	SD (KM)				3.121		
146	Variance (KM)				9.739	SE of Mean (KM)				0.818		
147	k hat (KM)				2.955	k star (KM)				2.473		
148	nu hat (KM)				100.5	nu star (KM)				84.07		
149	theta hat (KM)				1.815	theta star (KM)				2.17		
150	80% gamma percentile (KM)				7.831	90% gamma percentile (KM)				9.935		
151	95% gamma percentile (KM)				11.92	99% gamma percentile (KM)				16.26		
152												
153	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
154	Approximate Chi Square Value (84.07, $\alpha$ )				63.94	Adjusted Chi Square Value (84.07, $\beta$ )				62.1		
155	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				7.054	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				7.263		
156												
157	<b>Lognormal GOF Test on Detected Observations Only</b>											
158	Shapiro Wilk Test Statistic				0.919	<b>Shapiro Wilk GOF Test</b>						
159	5% Shapiro Wilk Critical Value				0.803	Detected Data appear Lognormal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
160	Lilliefors Test Statistic					0.269	Lilliefors GOF Test					
161	5% Lilliefors Critical Value					0.304	Detected Data appear Lognormal at 5% Significance Level					
162	Detected Data appear Lognormal at 5% Significance Level											
163												
164	Lognormal ROS Statistics Using Imputed Non-Detects											
165	Mean in Original Scale					6.563	Mean in Log Scale					1.832
166	SD in Original Scale					2.262	SD in Log Scale					0.316
167	95% t UCL (assumes normality of ROS data)					7.52	95% Percentile Bootstrap UCL					7.505
168	95% BCA Bootstrap UCL					7.603	95% Bootstrap t UCL					7.657
169	95% H-UCL (Log ROS)					7.608						
170												
171	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
172	KM Mean (logged)					1.518	KM Geo Mean					4.562
173	KM SD (logged)					0.558	95% Critical H Value (KM-Log)					2.095
174	KM Standard Error of Mean (logged)					0.146	95% H-UCL (KM -Log)					7.14
175	KM SD (logged)					0.558	95% Critical H Value (KM-Log)					2.095
176	KM Standard Error of Mean (logged)					0.146						
177												
178	DL/2 Statistics											
179	DL/2 Normal						DL/2 Log-Transformed					
180	Mean in Original Scale					4.588	Mean in Log Scale					1.158
181	SD in Original Scale					3.859	SD in Log Scale					0.882
182	95% t UCL (Assumes normality)					6.221	95% H-Stat UCL					8.132
183	DL/2 is not a recommended method, provided for comparisons and historical reasons											
184												
185	Nonparametric Distribution Free UCL Statistics											
186	Detected Data appear Normal Distributed at 5% Significance Level											
187												
188	Suggested UCL to Use											
189	95% KM (t) UCL					6.792						
190												
191	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
192	Recommendations are based upon data size, data distribution, and skewness.											
193	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
194	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
195												
196												
197	Arsenic											
198												
199	General Statistics											
200	Total Number of Observations					35	Number of Distinct Observations					29
201							Number of Missing Observations					0
202	Minimum					1.14	Mean					3.307
203	Maximum					5.9	Median					3.4
204	SD					1.151	Std. Error of Mean					0.195
205	Coefficient of Variation					0.348	Skewness					-0.136
206												
207	Normal GOF Test											
208	Shapiro Wilk Test Statistic					0.968	Shapiro Wilk GOF Test					
209	5% Shapiro Wilk Critical Value					0.934	Data appear Normal at 5% Significance Level					
210	Lilliefors Test Statistic					0.12	Lilliefors GOF Test					
211	5% Lilliefors Critical Value					0.148	Data appear Normal at 5% Significance Level					
212	Data appear Normal at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
213												
214	<b>Assuming Normal Distribution</b>											
215	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
216	95% Student's-t UCL					3.636	95% Adjusted-CLT UCL (Chen-1995)					3.622
217							95% Modified-t UCL (Johnson-1978)					3.635
218												
219	<b>Gamma GOF Test</b>											
220	A-D Test Statistic				0.955	<b>Anderson-Darling Gamma GOF Test</b>						
221	5% A-D Critical Value				0.749	Data Not Gamma Distributed at 5% Significance Level						
222	K-S Test Statistic				0.173	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
223	5% K-S Critical Value				0.149	Data Not Gamma Distributed at 5% Significance Level						
224	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
225												
226	<b>Gamma Statistics</b>											
227	k hat (MLE)				6.987	k star (bias corrected MLE)				6.407		
228	Theta hat (MLE)				0.473	Theta star (bias corrected MLE)				0.516		
229	nu hat (MLE)				489.1	nu star (bias corrected)				448.5		
230	MLE Mean (bias corrected)				3.307	MLE Sd (bias corrected)				1.307		
231						Approximate Chi Square Value (0.05)				400.4		
232	Adjusted Level of Significance				0.0425	Adjusted Chi Square Value				398.2		
233												
234	<b>Assuming Gamma Distribution</b>											
235	95% Approximate Gamma UCL (use when n>=50))				3.704	95% Adjusted Gamma UCL (use when n<50)				3.724		
236												
237	<b>Lognormal GOF Test</b>											
238	Shapiro Wilk Test Statistic				0.894	<b>Shapiro Wilk Lognormal GOF Test</b>						
239	5% Shapiro Wilk Critical Value				0.934	Data Not Lognormal at 5% Significance Level						
240	Lilliefors Test Statistic				0.196	<b>Lilliefors Lognormal GOF Test</b>						
241	5% Lilliefors Critical Value				0.148	Data Not Lognormal at 5% Significance Level						
242	<b>Data Not Lognormal at 5% Significance Level</b>											
243												
244	<b>Lognormal Statistics</b>											
245	Minimum of Logged Data				0.131	Mean of logged Data				1.123		
246	Maximum of Logged Data				1.775	SD of logged Data				0.416		
247												
248	<b>Assuming Lognormal Distribution</b>											
249	95% H-UCL				3.831	90% Chebyshev (MVUE) UCL				4.069		
250	95% Chebyshev (MVUE) UCL				4.399	97.5% Chebyshev (MVUE) UCL				4.856		
251	99% Chebyshev (MVUE) UCL				5.755							
252												
253	<b>Nonparametric Distribution Free UCL Statistics</b>											
254	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
255												
256	<b>Nonparametric Distribution Free UCLs</b>											
257	95% CLT UCL				3.627	95% Jackknife UCL				3.636		
258	95% Standard Bootstrap UCL				3.63	95% Bootstrap-t UCL				3.644		
259	95% Hall's Bootstrap UCL				3.62	95% Percentile Bootstrap UCL				3.634		
260	95% BCA Bootstrap UCL				3.633							
261	90% Chebyshev(Mean, Sd) UCL				3.891	95% Chebyshev(Mean, Sd) UCL				4.155		
262	97.5% Chebyshev(Mean, Sd) UCL				4.522	99% Chebyshev(Mean, Sd) UCL				5.243		
263												
264	<b>Suggested UCL to Use</b>											
265	95% Student's-t UCL				3.636							

	A	B	C	D	E	F	G	H	I	J	K	L
266												
267	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
268	Recommendations are based upon data size, data distribution, and skewness.											
269	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
270	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
271												
272	<b>Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be</b>											
273	<b>reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.</b>											
274												
275												
276	<b>Barium</b>											
277												
278	<b>General Statistics</b>											
279	Total Number of Observations				35		Number of Distinct Observations				33	
280							Number of Missing Observations				0	
281	Minimum				9.48		Mean				70.69	
282	Maximum				267		Median				49.8	
283	SD				69.72		Std. Error of Mean				11.78	
284	Coefficient of Variation				0.986		Skewness				1.445	
285												
286	<b>Normal GOF Test</b>											
287	Shapiro Wilk Test Statistic				0.798		<b>Shapiro Wilk GOF Test</b>					
288	5% Shapiro Wilk Critical Value				0.934		Data Not Normal at 5% Significance Level					
289	Lilliefors Test Statistic				0.218		<b>Lilliefors GOF Test</b>					
290	5% Lilliefors Critical Value				0.148		Data Not Normal at 5% Significance Level					
291	<b>Data Not Normal at 5% Significance Level</b>											
292												
293	<b>Assuming Normal Distribution</b>											
294	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
295	95% Student's-t UCL				90.62		95% Adjusted-CLT UCL (Chen-1995)				93.15	
296							95% Modified-t UCL (Johnson-1978)				91.1	
297												
298	<b>Gamma GOF Test</b>											
299	A-D Test Statistic				0.765		<b>Anderson-Darling Gamma GOF Test</b>					
300	5% A-D Critical Value				0.771		Detected data appear Gamma Distributed at 5% Significance Level					
301	K-S Test Statistic				0.115		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
302	5% K-S Critical Value				0.152		Detected data appear Gamma Distributed at 5% Significance Level					
303	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
304												
305	<b>Gamma Statistics</b>											
306	k hat (MLE)				1.243		k star (bias corrected MLE)				1.156	
307	Theta hat (MLE)				56.87		Theta star (bias corrected MLE)				61.17	
308	nu hat (MLE)				87.02		nu star (bias corrected)				80.89	
309	MLE Mean (bias corrected)				70.69		MLE Sd (bias corrected)				65.76	
310							Approximate Chi Square Value (0.05)				61.17	
311	Adjusted Level of Significance				0.0425		Adjusted Chi Square Value				60.35	
312												
313	<b>Assuming Gamma Distribution</b>											
314	95% Approximate Gamma UCL (use when n>=50)				93.49		95% Adjusted Gamma UCL (use when n<50)				94.75	
315												
316	<b>Lognormal GOF Test</b>											
317	Shapiro Wilk Test Statistic				0.947		<b>Shapiro Wilk Lognormal GOF Test</b>					
318	5% Shapiro Wilk Critical Value				0.934		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
319	Lilliefors Test Statistic					0.0976	Lilliefors Lognormal GOF Test					
320	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
321	Data appear Lognormal at 5% Significance Level											
322												
323	Lognormal Statistics											
324	Minimum of Logged Data					2.249	Mean of logged Data					3.805
325	Maximum of Logged Data					5.587	SD of logged Data					0.981
326												
327	Assuming Lognormal Distribution											
328	95% H-UCL					109.5	90% Chebyshev (MVUE) UCL					112.2
329	95% Chebyshev (MVUE) UCL					130.8	97.5% Chebyshev (MVUE) UCL					156.5
330	99% Chebyshev (MVUE) UCL					207						
331												
332	Nonparametric Distribution Free UCL Statistics											
333	Data appear to follow a Discernible Distribution at 5% Significance Level											
334												
335	Nonparametric Distribution Free UCLs											
336	95% CLT UCL					90.08	95% Jackknife UCL					90.62
337	95% Standard Bootstrap UCL					89.61	95% Bootstrap-t UCL					96.05
338	95% Hall's Bootstrap UCL					93.39	95% Percentile Bootstrap UCL					90.98
339	95% BCA Bootstrap UCL					91.76						
340	90% Chebyshev(Mean, Sd) UCL					106	95% Chebyshev(Mean, Sd) UCL					122.1
341	97.5% Chebyshev(Mean, Sd) UCL					144.3	99% Chebyshev(Mean, Sd) UCL					187.9
342												
343	Suggested UCL to Use											
344	95% Adjusted Gamma UCL					94.75						
345												
346	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
347	Recommendations are based upon data size, data distribution, and skewness.											
348	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
349	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
350												
351	Cadmium											
352												
353	General Statistics											
354	Total Number of Observations					21	Number of Distinct Observations					19
355	Number of Detects					11	Number of Non-Detects					10
356	Number of Distinct Detects					9	Number of Distinct Non-Detects					10
357	Minimum Detect					0.56	Minimum Non-Detect					0.241
358	Maximum Detect					2.1	Maximum Non-Detect					0.293
359	Variance Detects					0.191	Percent Non-Detects					47.62%
360	Mean Detects					0.952	SD Detects					0.437
361	Median Detects					0.9	CV Detects					0.46
362	Skewness Detects					1.975	Kurtosis Detects					4.884
363	Mean of Logged Detects					-0.125	SD of Logged Detects					0.39
364												
365	Normal GOF Test on Detects Only											
366	Shapiro Wilk Test Statistic					0.795	Shapiro Wilk GOF Test					
367	5% Shapiro Wilk Critical Value					0.85	Detected Data Not Normal at 5% Significance Level					
368	Lilliefors Test Statistic					0.211	Lilliefors GOF Test					
369	5% Lilliefors Critical Value					0.251	Detected Data appear Normal at 5% Significance Level					
370	Detected Data appear Approximate Normal at 5% Significance Level											
371												

	A	B	C	D	E	F	G	H	I	J	K	L
372	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
373	KM Mean				0.613	KM Standard Error of Mean				0.107		
374	KM SD				0.466	95% KM (BCA) UCL				0.797		
375	95% KM (t) UCL				0.797	95% KM (Percentile Bootstrap) UCL				0.795		
376	95% KM (z) UCL				0.789	95% KM Bootstrap t UCL				0.853		
377	90% KM Chebyshev UCL				0.933	95% KM Chebyshev UCL				1.078		
378	97.5% KM Chebyshev UCL				1.279	99% KM Chebyshev UCL				1.675		
379												
380	<b>Gamma GOF Tests on Detected Observations Only</b>											
381	A-D Test Statistic				0.439	<b>Anderson-Darling GOF Test</b>						
382	5% A-D Critical Value				0.731	Detected data appear Gamma Distributed at 5% Significance Level						
383	K-S Test Statistic				0.157	<b>Kolmogorov-Smirnov GOF</b>						
384	5% K-S Critical Value				0.256	Detected data appear Gamma Distributed at 5% Significance Level						
385	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
386												
387	<b>Gamma Statistics on Detected Data Only</b>											
388	k hat (MLE)				6.74	k star (bias corrected MLE)				4.963		
389	Theta hat (MLE)				0.141	Theta star (bias corrected MLE)				0.192		
390	nu hat (MLE)				148.3	nu star (bias corrected)				109.2		
391	Mean (detects)				0.952							
392												
393	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
394	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
395	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
396	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
397	This is especially true when the sample size is small.											
398	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
399	Minimum				0.0142	Mean				0.505		
400	Maximum				2.1	Median				0.56		
401	SD				0.571	CV				1.13		
402	k hat (MLE)				0.458	k star (bias corrected MLE)				0.424		
403	Theta hat (MLE)				1.104	Theta star (bias corrected MLE)				1.192		
404	nu hat (MLE)				19.22	nu star (bias corrected)				17.8		
405	Adjusted Level of Significance ( $\beta$ )				0.0383							
406	Approximate Chi Square Value (17.80, $\alpha$ )				9.25	Adjusted Chi Square Value (17.80, $\beta$ )				8.778		
407	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.973	95% Gamma Adjusted UCL (use when $n < 50$ )				1.025		
408												
409	<b>Estimates of Gamma Parameters using KM Estimates</b>											
410	Mean (KM)				0.613	SD (KM)				0.466		
411	Variance (KM)				0.217	SE of Mean (KM)				0.107		
412	k hat (KM)				1.732	k star (KM)				1.517		
413	nu hat (KM)				72.76	nu star (KM)				63.7		
414	theta hat (KM)				0.354	theta star (KM)				0.404		
415	80% gamma percentile (KM)				0.948	90% gamma percentile (KM)				1.275		
416	95% gamma percentile (KM)				1.592	99% gamma percentile (KM)				2.308		
417												
418	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
419	Approximate Chi Square Value (63.70, $\alpha$ )				46.34	Adjusted Chi Square Value (63.70, $\beta$ )				45.2		
420	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.843	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.864		
421												
422	<b>Lognormal GOF Test on Detected Observations Only</b>											
423	Shapiro Wilk Test Statistic				0.919	<b>Shapiro Wilk GOF Test</b>						
424	5% Shapiro Wilk Critical Value				0.85	Detected Data appear Lognormal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
425	Lilliefors Test Statistic					0.131	Lilliefors GOF Test					
426	5% Lilliefors Critical Value					0.251	Detected Data appear Lognormal at 5% Significance Level					
427	Detected Data appear Lognormal at 5% Significance Level											
428												
429	Lognormal ROS Statistics Using Imputed Non-Detects											
430	Mean in Original Scale					0.646	Mean in Log Scale					-0.622
431	SD in Original Scale					0.451	SD in Log Scale					0.601
432	95% t UCL (assumes normality of ROS data)					0.816	95% Percentile Bootstrap UCL					0.816
433	95% BCA Bootstrap UCL					0.865	95% Bootstrap t UCL					0.879
434	95% H-UCL (Log ROS)					0.851						
435												
436	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
437	KM Mean (logged)					-0.743	KM Geo Mean					0.476
438	KM SD (logged)					0.702	95% Critical H Value (KM-Log)					2.193
439	KM Standard Error of Mean (logged)					0.161	95% H-UCL (KM -Log)					0.858
440	KM SD (logged)					0.702	95% Critical H Value (KM-Log)					2.193
441	KM Standard Error of Mean (logged)					0.161						
442												
443	DL/2 Statistics											
444	DL/2 Normal						DL/2 Log-Transformed					
445	Mean in Original Scale					0.561	Mean in Log Scale					-1.035
446	SD in Original Scale					0.522	SD in Log Scale					1.016
447	95% t UCL (Assumes normality)					0.757	95% H-Stat UCL					1.072
448	DL/2 is not a recommended method, provided for comparisons and historical reasons											
449												
450	Nonparametric Distribution Free UCL Statistics											
451	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
452												
453	Suggested UCL to Use											
454	95% KM (t) UCL					0.797						
455												
456	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
457	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
458												
459	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
460	Recommendations are based upon data size, data distribution, and skewness.											
461	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
462	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
463												
464												
465	Chromium											
466												
467	General Statistics											
468	Total Number of Observations					34	Number of Distinct Observations					33
469							Number of Missing Observations					0
470	Minimum					1	Mean					17.9
471	Maximum					303	Median					7.55
472	SD					50.65	Std. Error of Mean					8.686
473	Coefficient of Variation					2.83	Skewness					5.734
474												
475	Normal GOF Test											
476	Shapiro Wilk Test Statistic					0.252	Shapiro Wilk GOF Test					
477	5% Shapiro Wilk Critical Value					0.933	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
478	Lilliefors Test Statistic					0.42	Lilliefors GOF Test					
479	5% Lilliefors Critical Value					0.15	Data Not Normal at 5% Significance Level					
480	Data Not Normal at 5% Significance Level											
481												
482	Assuming Normal Distribution											
483	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
484	95% Student's-t UCL					32.6	95% Adjusted-CLT UCL (Chen-1995)					41.31
485							95% Modified-t UCL (Johnson-1978)					34.02
486												
487	Gamma GOF Test											
488	A-D Test Statistic					4.803	Anderson-Darling Gamma GOF Test					
489	5% A-D Critical Value					0.784	Data Not Gamma Distributed at 5% Significance Level					
490	K-S Test Statistic					0.286	Kolmogorov-Smirnov Gamma GOF Test					
491	5% K-S Critical Value					0.156	Data Not Gamma Distributed at 5% Significance Level					
492	Data Not Gamma Distributed at 5% Significance Level											
493												
494	Gamma Statistics											
495	k hat (MLE)					0.831	k star (bias corrected MLE)					0.777
496	Theta hat (MLE)					21.54	Theta star (bias corrected MLE)					23.03
497	nu hat (MLE)					56.49	nu star (bias corrected)					52.84
498	MLE Mean (bias corrected)					17.9	MLE Sd (bias corrected)					20.3
499							Approximate Chi Square Value (0.05)					37.14
500	Adjusted Level of Significance					0.0422	Adjusted Chi Square Value					36.49
501												
502	Assuming Gamma Distribution											
503	95% Approximate Gamma UCL (use when n>=50))					25.46	95% Adjusted Gamma UCL (use when n<50)					25.92
504												
505	Lognormal GOF Test											
506	Shapiro Wilk Test Statistic					0.83	Shapiro Wilk Lognormal GOF Test					
507	5% Shapiro Wilk Critical Value					0.933	Data Not Lognormal at 5% Significance Level					
508	Lilliefors Test Statistic					0.142	Lilliefors Lognormal GOF Test					
509	5% Lilliefors Critical Value					0.15	Data appear Lognormal at 5% Significance Level					
510	Data appear Approximate Lognormal at 5% Significance Level											
511												
512	Lognormal Statistics											
513	Minimum of Logged Data					0	Mean of logged Data					2.174
514	Maximum of Logged Data					5.714	SD of logged Data					0.864
515												
516	Assuming Lognormal Distribution											
517	95% H-UCL					18.03	90% Chebyshev (MVUE) UCL					18.87
518	95% Chebyshev (MVUE) UCL					21.72	97.5% Chebyshev (MVUE) UCL					25.68
519	99% Chebyshev (MVUE) UCL					33.44						
520												
521	Nonparametric Distribution Free UCL Statistics											
522	Data appear to follow a Discernible Distribution at 5% Significance Level											
523												
524	Nonparametric Distribution Free UCLs											
525	95% CLT UCL					32.18	95% Jackknife UCL					32.6
526	95% Standard Bootstrap UCL					31.93	95% Bootstrap-t UCL					130.9
527	95% Hall's Bootstrap UCL					90.4	95% Percentile Bootstrap UCL					34.62
528	95% BCA Bootstrap UCL					44.25						
529	90% Chebyshev(Mean, Sd) UCL					43.95	95% Chebyshev(Mean, Sd) UCL					55.76
530	97.5% Chebyshev(Mean, Sd) UCL					72.14	99% Chebyshev(Mean, Sd) UCL					104.3



	A	B	C	D	E	F	G	H	I	J	K	L
531												
532	<b>Suggested UCL to Use</b>											
533	95% H-UCL					18.03						
534												
535	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
536	Recommendations are based upon data size, data distribution, and skewness.											
537	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
538	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
539												
540	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
541	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
542	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
543	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
544												
545	<b>Cobalt</b>											
546												
547	<b>General Statistics</b>											
548	Total Number of Observations				20		Number of Distinct Observations				19	
549	Number of Detects				17		Number of Non-Detects				3	
550	Number of Distinct Detects				16		Number of Distinct Non-Detects				3	
551	Minimum Detect				2.7		Minimum Non-Detect				2.41	
552	Maximum Detect				59.6		Maximum Non-Detect				2.93	
553	Variance Detects				199.3		Percent Non-Detects				15%	
554	Mean Detects				8.852		SD Detects				14.12	
555	Median Detects				4.8		CV Detects				1.595	
556	Skewness Detects				3.368		Kurtosis Detects				11.76	
557	Mean of Logged Detects				1.688		SD of Logged Detects				0.814	
558												
559	<b>Normal GOF Test on Detects Only</b>											
560	Shapiro Wilk Test Statistic				0.455		<b>Shapiro Wilk GOF Test</b>					
561	5% Shapiro Wilk Critical Value				0.892		Detected Data Not Normal at 5% Significance Level					
562	Lilliefors Test Statistic				0.435		<b>Lilliefors GOF Test</b>					
563	5% Lilliefors Critical Value				0.207		Detected Data Not Normal at 5% Significance Level					
564	<b>Detected Data Not Normal at 5% Significance Level</b>											
565												
566	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
567	KM Mean				7.895		KM Standard Error of Mean				2.957	
568	KM SD				12.83		95% KM (BCA) UCL				13.37	
569	95% KM (t) UCL				13.01		95% KM (Percentile Bootstrap) UCL				12.8	
570	95% KM (z) UCL				12.76		95% KM Bootstrap t UCL				47.51	
571	90% KM Chebyshev UCL				16.77		95% KM Chebyshev UCL				20.79	
572	97.5% KM Chebyshev UCL				26.36		99% KM Chebyshev UCL				37.32	
573												
574	<b>Gamma GOF Tests on Detected Observations Only</b>											
575	A-D Test Statistic				2.638		<b>Anderson-Darling GOF Test</b>					
576	5% A-D Critical Value				0.763		Detected Data Not Gamma Distributed at 5% Significance Level					
577	K-S Test Statistic				0.358		<b>Kolmogorov-Smirnov GOF</b>					
578	5% K-S Critical Value				0.214		Detected Data Not Gamma Distributed at 5% Significance Level					
579	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
580												
581	<b>Gamma Statistics on Detected Data Only</b>											
582	k hat (MLE)				1.153		k star (bias corrected MLE)				0.989	
583	Theta hat (MLE)				7.678		Theta star (bias corrected MLE)				8.953	

	A	B	C	D	E	F	G	H	I	J	K	L
584					nu hat (MLE)	39.2				nu star (bias corrected)		33.62
585					Mean (detects)	8.852						
586												
587	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
588	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
589	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
590	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
591	This is especially true when the sample size is small.											
592	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
593					Minimum	0.01				Mean		7.526
594					Maximum	59.6				Median		4.19
595					SD	13.35				CV		1.774
596					k hat (MLE)	0.499				k star (bias corrected MLE)		0.457
597					Theta hat (MLE)	15.09				Theta star (bias corrected MLE)		16.46
598					nu hat (MLE)	19.95				nu star (bias corrected)		18.29
599					Adjusted Level of Significance ( $\beta$ )	0.038						
600					Approximate Chi Square Value (18.29, $\alpha$ )	9.599				Adjusted Chi Square Value (18.29, $\beta$ )		9.103
601					95% Gamma Approximate UCL (use when $n \geq 50$ )	14.34				95% Gamma Adjusted UCL (use when $n < 50$ )		15.12
602												
603	<b>Estimates of Gamma Parameters using KM Estimates</b>											
604					Mean (KM)	7.895				SD (KM)		12.83
605					Variance (KM)	164.6				SE of Mean (KM)		2.957
606					k hat (KM)	0.379				k star (KM)		0.355
607					nu hat (KM)	15.14				nu star (KM)		14.21
608					theta hat (KM)	20.85				theta star (KM)		22.23
609					80% gamma percentile (KM)	12.53				90% gamma percentile (KM)		22.75
610					95% gamma percentile (KM)	34.16				99% gamma percentile (KM)		63.24
611												
612	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
613					Approximate Chi Square Value (14.21, $\alpha$ )	6.713				Adjusted Chi Square Value (14.21, $\beta$ )		6.308
614					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	16.71				95% Gamma Adjusted KM-UCL (use when $n < 50$ )		17.78
615												
616	<b>Lognormal GOF Test on Detected Observations Only</b>											
617					Shapiro Wilk Test Statistic	0.737				<b>Shapiro Wilk GOF Test</b>		
618					5% Shapiro Wilk Critical Value	0.892				Detected Data Not Lognormal at 5% Significance Level		
619					Lilliefors Test Statistic	0.281				<b>Lilliefors GOF Test</b>		
620					5% Lilliefors Critical Value	0.207				Detected Data Not Lognormal at 5% Significance Level		
621	<b>Detected Data Not Lognormal at 5% Significance Level</b>											
622												
623	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
624					Mean in Original Scale	7.707				Mean in Log Scale		1.46
625					SD in Original Scale	13.25				SD in Log Scale		0.936
626					95% t UCL (assumes normality of ROS data)	12.83				95% Percentile Bootstrap UCL		13.06
627					95% BCA Bootstrap UCL	15.65				95% Bootstrap t UCL		39.93
628					95% H-UCL (Log ROS)	11.52						
629												
630	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
631					KM Mean (logged)	1.57				KM Geo Mean		4.808
632					KM SD (logged)	0.781				95% Critical H Value (KM-Log)		2.335
633					KM Standard Error of Mean (logged)	0.18				95% H-UCL (KM -Log)		9.905
634					KM SD (logged)	0.781				95% Critical H Value (KM-Log)		2.335
635					KM Standard Error of Mean (logged)	0.18						
636												

	A	B	C	D	E	F	G	H	I	J	K	L
637	<b>DL/2 Statistics</b>											
638	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
639	Mean in Original Scale					7.722	Mean in Log Scale					1.476
640	SD in Original Scale					13.25	SD in Log Scale					0.91
641	95% t UCL (Assumes normality)					12.84	95% H-Stat UCL					11.17
642	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
643												
644	<b>Nonparametric Distribution Free UCL Statistics</b>											
645	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
646												
647	<b>Suggested UCL to Use</b>											
648	95% KM (Chebyshev) UCL					20.79						
649												
650	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
651	Recommendations are based upon data size, data distribution, and skewness.											
652	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
653	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
654												
655												
656	<b>Copper</b>											
657												
658	<b>General Statistics</b>											
659	Total Number of Observations				21	Number of Distinct Observations				21		
660						Number of Missing Observations				0		
661	Minimum				5.67	Mean				44.35		
662	Maximum				311	Median				16		
663	SD				70.61	Std. Error of Mean				15.41		
664	Coefficient of Variation				1.592	Skewness				3.073		
665												
666	<b>Normal GOF Test</b>											
667	Shapiro Wilk Test Statistic				0.573	<b>Shapiro Wilk GOF Test</b>						
668	5% Shapiro Wilk Critical Value				0.908	Data Not Normal at 5% Significance Level						
669	Lilliefors Test Statistic				0.292	<b>Lilliefors GOF Test</b>						
670	5% Lilliefors Critical Value				0.188	Data Not Normal at 5% Significance Level						
671	<b>Data Not Normal at 5% Significance Level</b>											
672												
673	<b>Assuming Normal Distribution</b>											
674	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
675	95% Student's-t UCL					70.93	95% Adjusted-CLT UCL (Chen-1995)					80.74
676							95% Modified-t UCL (Johnson-1978)					72.65
677												
678	<b>Gamma GOF Test</b>											
679	A-D Test Statistic				1.388	<b>Anderson-Darling Gamma GOF Test</b>						
680	5% A-D Critical Value				0.779	Data Not Gamma Distributed at 5% Significance Level						
681	K-S Test Statistic				0.248	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
682	5% K-S Critical Value				0.196	Data Not Gamma Distributed at 5% Significance Level						
683	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
684												
685	<b>Gamma Statistics</b>											
686	k hat (MLE)				0.829	k star (bias corrected MLE)				0.743		
687	Theta hat (MLE)				53.49	Theta star (bias corrected MLE)				59.74		
688	nu hat (MLE)				34.83	nu star (bias corrected)				31.19		
689	MLE Mean (bias corrected)				44.35	MLE Sd (bias corrected)				51.47		

	A	B	C	D	E	F	G	H	I	J	K	L
690							Approximate Chi Square Value (0.05)					19.43
691	Adjusted Level of Significance					0.0383	Adjusted Chi Square Value					18.71
692												
693	<b>Assuming Gamma Distribution</b>											
694	95% Approximate Gamma UCL (use when n>=50))					71.2	95% Adjusted Gamma UCL (use when n<50)					73.91
695												
696	<b>Lognormal GOF Test</b>											
697	Shapiro Wilk Test Statistic					0.912	<b>Shapiro Wilk Lognormal GOF Test</b>					
698	5% Shapiro Wilk Critical Value					0.908	Data appear Lognormal at 5% Significance Level					
699	Lilliefors Test Statistic					0.188	<b>Lilliefors Lognormal GOF Test</b>					
700	5% Lilliefors Critical Value					0.188	Data Not Lognormal at 5% Significance Level					
701	<b>Data appear Approximate Lognormal at 5% Significance Level</b>											
702												
703	<b>Lognormal Statistics</b>											
704	Minimum of Logged Data					1.735	Mean of logged Data					3.08
705	Maximum of Logged Data					5.74	SD of logged Data					1.116
706												
707	<b>Assuming Lognormal Distribution</b>											
708	95% H-UCL					80.1	90% Chebyshev (MVUE) UCL					71.22
709	95% Chebyshev (MVUE) UCL					85.9	97.5% Chebyshev (MVUE) UCL					106.3
710	99% Chebyshev (MVUE) UCL					146.3						
711												
712	<b>Nonparametric Distribution Free UCL Statistics</b>											
713	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
714												
715	<b>Nonparametric Distribution Free UCLs</b>											
716	95% CLT UCL					69.7	95% Jackknife UCL					70.93
717	95% Standard Bootstrap UCL					69.53	95% Bootstrap-t UCL					103.3
718	95% Hall's Bootstrap UCL					154.2	95% Percentile Bootstrap UCL					70.03
719	95% BCA Bootstrap UCL					84.81						
720	90% Chebyshev(Mean, Sd) UCL					90.58	95% Chebyshev(Mean, Sd) UCL					111.5
721	97.5% Chebyshev(Mean, Sd) UCL					140.6	99% Chebyshev(Mean, Sd) UCL					197.7
722												
723	<b>Suggested UCL to Use</b>											
724	95% Chebyshev (Mean, Sd) UCL					111.5						
725												
726	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
727	Recommendations are based upon data size, data distribution, and skewness.											
728	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
729	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
730												
731												
732	<b>Lead</b>											
733												
734	<b>General Statistics</b>											
735	Total Number of Observations					31	Number of Distinct Observations					31
736							Number of Missing Observations					0
737	Minimum					5.03	Mean					67.69
738	Maximum					477	Median					39.4
739	SD					93.39	Std. Error of Mean					16.77
740	Coefficient of Variation					1.38	Skewness					3.25
741												
742	<b>Normal GOF Test</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
743	Shapiro Wilk Test Statistic					0.627	Shapiro Wilk GOF Test					
744	5% Shapiro Wilk Critical Value					0.929	Data Not Normal at 5% Significance Level					
745	Lilliefors Test Statistic					0.257	Lilliefors GOF Test					
746	5% Lilliefors Critical Value					0.156	Data Not Normal at 5% Significance Level					
747	Data Not Normal at 5% Significance Level											
748												
749	Assuming Normal Distribution											
750	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
751	95% Student's-t UCL					96.16	95% Adjusted-CLT UCL (Chen-1995)					105.7
752							95% Modified-t UCL (Johnson-1978)					97.79
753												
754	Gamma GOF Test											
755	A-D Test Statistic					0.604	Anderson-Darling Gamma GOF Test					
756	5% A-D Critical Value					0.779	Detected data appear Gamma Distributed at 5% Significance Level					
757	K-S Test Statistic					0.114	Kolmogorov-Smirnov Gamma GOF Test					
758	5% K-S Critical Value					0.163	Detected data appear Gamma Distributed at 5% Significance Level					
759	Detected data appear Gamma Distributed at 5% Significance Level											
760												
761	Gamma Statistics											
762	k hat (MLE)					0.923	k star (bias corrected MLE)					0.855
763	Theta hat (MLE)					73.37	Theta star (bias corrected MLE)					79.19
764	nu hat (MLE)					57.2	nu star (bias corrected)					52.99
765	MLE Mean (bias corrected)					67.69	MLE Sd (bias corrected)					73.21
766							Approximate Chi Square Value (0.05)					37.27
767	Adjusted Level of Significance					0.0413	Adjusted Chi Square Value					36.54
768												
769	Assuming Gamma Distribution											
770	95% Approximate Gamma UCL (use when n>=50)					96.24	95% Adjusted Gamma UCL (use when n<50)					98.17
771												
772	Lognormal GOF Test											
773	Shapiro Wilk Test Statistic					0.962	Shapiro Wilk Lognormal GOF Test					
774	5% Shapiro Wilk Critical Value					0.929	Data appear Lognormal at 5% Significance Level					
775	Lilliefors Test Statistic					0.147	Lilliefors Lognormal GOF Test					
776	5% Lilliefors Critical Value					0.156	Data appear Lognormal at 5% Significance Level					
777	Data appear Lognormal at 5% Significance Level											
778												
779	Lognormal Statistics											
780	Minimum of Logged Data					1.615	Mean of logged Data					3.583
781	Maximum of Logged Data					6.168	SD of logged Data					1.165
782												
783	Assuming Lognormal Distribution											
784	95% H-UCL					124.1	90% Chebyshev (MVUE) UCL					119.8
785	95% Chebyshev (MVUE) UCL					143	97.5% Chebyshev (MVUE) UCL					175.2
786	99% Chebyshev (MVUE) UCL					238.5						
787												
788	Nonparametric Distribution Free UCL Statistics											
789	Data appear to follow a Discernible Distribution at 5% Significance Level											
790												
791	Nonparametric Distribution Free UCLs											
792	95% CLT UCL					95.28	95% Jackknife UCL					96.16
793	95% Standard Bootstrap UCL					94.64	95% Bootstrap-t UCL					121.9
794	95% Hall's Bootstrap UCL					220.5	95% Percentile Bootstrap UCL					98.03
795	95% BCA Bootstrap UCL					108.8						

	A	B	C	D	E	F	G	H	I	J	K	L
796	90% Chebyshev(Mean, Sd) UCL					118	95% Chebyshev(Mean, Sd) UCL					140.8
797	97.5% Chebyshev(Mean, Sd) UCL					172.4	99% Chebyshev(Mean, Sd) UCL					234.6
798												
799	<b>Suggested UCL to Use</b>											
800	95% Adjusted Gamma UCL					98.17						
801												
802	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
803	Recommendations are based upon data size, data distribution, and skewness.											
804	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
805	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
806												
807												
808	<b>Manganese</b>											
809												
810	<b>General Statistics</b>											
811	Total Number of Observations					35	Number of Distinct Observations					34
812							Number of Missing Observations					0
813	Minimum					68.9	Mean					471.3
814	Maximum					1650	Median					271
815	SD					423.3	Std. Error of Mean					71.55
816	Coefficient of Variation					0.898	Skewness					1.698
817												
818	<b>Normal GOF Test</b>											
819	Shapiro Wilk Test Statistic					0.755	<b>Shapiro Wilk GOF Test</b>					
820	5% Shapiro Wilk Critical Value					0.934	Data Not Normal at 5% Significance Level					
821	Lilliefors Test Statistic					0.2	<b>Lilliefors GOF Test</b>					
822	5% Lilliefors Critical Value					0.148	Data Not Normal at 5% Significance Level					
823	<b>Data Not Normal at 5% Significance Level</b>											
824												
825	<b>Assuming Normal Distribution</b>											
826	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
827	95% Student's-t UCL					592.3	95% Adjusted-CLT UCL (Chen-1995)					611
828							95% Modified-t UCL (Johnson-1978)					595.7
829												
830	<b>Gamma GOF Test</b>											
831	A-D Test Statistic					1.302	<b>Anderson-Darling Gamma GOF Test</b>					
832	5% A-D Critical Value					0.763	Data Not Gamma Distributed at 5% Significance Level					
833	K-S Test Statistic					0.173	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
834	5% K-S Critical Value					0.151	Data Not Gamma Distributed at 5% Significance Level					
835	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
836												
837	<b>Gamma Statistics</b>											
838	k hat (MLE)					1.755	k star (bias corrected MLE)					1.624
839	Theta hat (MLE)					268.5	Theta star (bias corrected MLE)					290.3
840	nu hat (MLE)					122.9	nu star (bias corrected)					113.7
841	MLE Mean (bias corrected)					471.3	MLE Sd (bias corrected)					369.9
842							Approximate Chi Square Value (0.05)					90.06
843	Adjusted Level of Significance					0.0425	Adjusted Chi Square Value					89.06
844												
845	<b>Assuming Gamma Distribution</b>											
846	95% Approximate Gamma UCL (use when n>=50))					594.9	95% Adjusted Gamma UCL (use when n<50)					601.6
847												
848	<b>Lognormal GOF Test</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
849	Shapiro Wilk Test Statistic					0.949	Shapiro Wilk Lognormal GOF Test					
850	5% Shapiro Wilk Critical Value					0.934	Data appear Lognormal at 5% Significance Level					
851	Lilliefors Test Statistic					0.137	Lilliefors Lognormal GOF Test					
852	5% Lilliefors Critical Value					0.148	Data appear Lognormal at 5% Significance Level					
853	Data appear Lognormal at 5% Significance Level											
854												
855	Lognormal Statistics											
856	Minimum of Logged Data					4.233	Mean of logged Data					5.844
857	Maximum of Logged Data					7.409	SD of logged Data					0.773
858												
859	Assuming Lognormal Distribution											
860	95% H-UCL					623.2	90% Chebyshev (MVUE) UCL					659.7
861	95% Chebyshev (MVUE) UCL					749.9	97.5% Chebyshev (MVUE) UCL					875
862	99% Chebyshev (MVUE) UCL					1121						
863												
864	Nonparametric Distribution Free UCL Statistics											
865	Data appear to follow a Discernible Distribution at 5% Significance Level											
866												
867	Nonparametric Distribution Free UCLs											
868	95% CLT UCL					589	95% Jackknife UCL					592.3
869	95% Standard Bootstrap UCL					587.9	95% Bootstrap-t UCL					638.1
870	95% Hall's Bootstrap UCL					606.8	95% Percentile Bootstrap UCL					593.1
871	95% BCA Bootstrap UCL					612.1						
872	90% Chebyshev(Mean, Sd) UCL					686	95% Chebyshev(Mean, Sd) UCL					783.2
873	97.5% Chebyshev(Mean, Sd) UCL					918.1	99% Chebyshev(Mean, Sd) UCL					1183
874												
875	Suggested UCL to Use											
876	95% H-UCL					623.2						
877												
878	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
879	Recommendations are based upon data size, data distribution, and skewness.											
880	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
881	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
882												
883	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
884	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
885	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
886	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
887												
888												
889	Mercury											
890												
891	General Statistics											
892	Total Number of Observations					19	Number of Distinct Observations					16
893							Number of Missing Observations					0
894	Minimum					0.009	Mean					0.162
895	Maximum					0.457	Median					0.127
896	SD					0.154	Std. Error of Mean					0.0354
897	Coefficient of Variation					0.954	Skewness					0.711
898												
899	Normal GOF Test											
900	Shapiro Wilk Test Statistic					0.865	Shapiro Wilk GOF Test					
901	5% Shapiro Wilk Critical Value					0.901	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
902	Lilliefors Test Statistic					0.187	Lilliefors GOF Test					
903	5% Lilliefors Critical Value					0.197	Data appear Normal at 5% Significance Level					
904	Data appear Approximate Normal at 5% Significance Level											
905												
906	Assuming Normal Distribution											
907	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
908	95% Student's-t UCL					0.223	95% Adjusted-CLT UCL (Chen-1995)					0.226
909							95% Modified-t UCL (Johnson-1978)					0.224
910												
911	Gamma GOF Test											
912	A-D Test Statistic					0.901	Anderson-Darling Gamma GOF Test					
913	5% A-D Critical Value					0.778	Data Not Gamma Distributed at 5% Significance Level					
914	K-S Test Statistic					0.193	Kolmogorov-Smirnov Gamma GOF Test					
915	5% K-S Critical Value					0.206	Detected data appear Gamma Distributed at 5% Significance Level					
916	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
917												
918	Gamma Statistics											
919	k hat (MLE)					0.774	k star (bias corrected MLE)					0.687
920	Theta hat (MLE)					0.209	Theta star (bias corrected MLE)					0.235
921	nu hat (MLE)					29.41	nu star (bias corrected)					26.1
922	MLE Mean (bias corrected)					0.162	MLE Sd (bias corrected)					0.195
923							Approximate Chi Square Value (0.05)					15.46
924	Adjusted Level of Significance					0.0369	Adjusted Chi Square Value					14.74
925												
926	Assuming Gamma Distribution											
927	95% Approximate Gamma UCL (use when n>=50))					0.273	95% Adjusted Gamma UCL (use when n<50)					0.286
928												
929	Lognormal GOF Test											
930	Shapiro Wilk Test Statistic					0.84	Shapiro Wilk Lognormal GOF Test					
931	5% Shapiro Wilk Critical Value					0.901	Data Not Lognormal at 5% Significance Level					
932	Lilliefors Test Statistic					0.254	Lilliefors Lognormal GOF Test					
933	5% Lilliefors Critical Value					0.197	Data Not Lognormal at 5% Significance Level					
934	Data Not Lognormal at 5% Significance Level											
935												
936	Lognormal Statistics											
937	Minimum of Logged Data					-4.711	Mean of logged Data					-2.593
938	Maximum of Logged Data					-0.783	SD of logged Data					1.517
939												
940	Assuming Lognormal Distribution											
941	95% H-UCL					0.801	90% Chebyshev (MVUE) UCL					0.473
942	95% Chebyshev (MVUE) UCL					0.591	97.5% Chebyshev (MVUE) UCL					0.756
943	99% Chebyshev (MVUE) UCL					1.079						
944												
945	Nonparametric Distribution Free UCL Statistics											
946	Data appear to follow a Discernible Distribution at 5% Significance Level											
947												
948	Nonparametric Distribution Free UCLs											
949	95% CLT UCL					0.22	95% Jackknife UCL					0.223
950	95% Standard Bootstrap UCL					0.216	95% Bootstrap-t UCL					0.231
951	95% Hall's Bootstrap UCL					0.224	95% Percentile Bootstrap UCL					0.224
952	95% BCA Bootstrap UCL					0.225						
953	90% Chebyshev(Mean, Sd) UCL					0.268	95% Chebyshev(Mean, Sd) UCL					0.316
954	97.5% Chebyshev(Mean, Sd) UCL					0.382	99% Chebyshev(Mean, Sd) UCL					0.513



	A	B	C	D	E	F	G	H	I	J	K	L
955												
956	<b>Suggested UCL to Use</b>											
957	95% Student's-t UCL					0.223						
958												
959	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
960	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
961												
962	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
963	Recommendations are based upon data size, data distribution, and skewness.											
964	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
965	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
966												
967	<b>Thallium</b>											
968												
969	<b>General Statistics</b>											
970	Total Number of Observations				10		Number of Distinct Observations				8	
971	Number of Detects				2		Number of Non-Detects				8	
972	Number of Distinct Detects				2		Number of Distinct Non-Detects				7	
973	Minimum Detect				1.32		Minimum Non-Detect				1.2	
974	Maximum Detect				3.22		Maximum Non-Detect				1.46	
975	Variance Detects				1.805		Percent Non-Detects				80%	
976	Mean Detects				2.27		SD Detects				1.344	
977	Median Detects				2.27		CV Detects				0.592	
978	Skewness Detects				N/A		Kurtosis Detects				N/A	
979	Mean of Logged Detects				0.724		SD of Logged Detects				0.631	
980												
981	<b>Warning: Data set has only 2 Detected Values.</b>											
982	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											
983												
984												
985	<b>Normal GOF Test on Detects Only</b>											
986	<b>Not Enough Data to Perform GOF Test</b>											
987												
988	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
989	KM Mean				1.42		KM Standard Error of Mean				0.269	
990	KM SD				0.601		95% KM (BCA) UCL				N/A	
991	95% KM (t) UCL				1.914		95% KM (Percentile Bootstrap) UCL				N/A	
992	95% KM (z) UCL				1.863		95% KM Bootstrap t UCL				N/A	
993	90% KM Chebyshev UCL				2.228		95% KM Chebyshev UCL				2.594	
994	97.5% KM Chebyshev UCL				3.102		99% KM Chebyshev UCL				4.1	
995												
996	<b>Gamma GOF Tests on Detected Observations Only</b>											
997	<b>Not Enough Data to Perform GOF Test</b>											
998												
999	<b>Gamma Statistics on Detected Data Only</b>											
1000	k hat (MLE)				5.355		k star (bias corrected MLE)				N/A	
1001	Theta hat (MLE)				0.424		Theta star (bias corrected MLE)				N/A	
1002	nu hat (MLE)				21.42		nu star (bias corrected)				N/A	
1003	Mean (detects)				2.27							
1004												
1005	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1006	Mean (KM)				1.42		SD (KM)				0.601	
1007	Variance (KM)				0.362		SE of Mean (KM)				0.269	

	A	B	C	D	E	F	G	H	I	J	K	L
1008					k hat (KM)	5.573					k star (KM)	3.968
1009					nu hat (KM)	111.5					nu star (KM)	79.36
1010					theta hat (KM)	0.255					theta star (KM)	0.358
1011					80% gamma percentile (KM)	1.96					90% gamma percentile (KM)	2.376
1012					95% gamma percentile (KM)	2.758					99% gamma percentile (KM)	3.577
1013												
1014	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1015											Adjusted Level of Significance ( $\beta$ )	0.0267
1016					Approximate Chi Square Value (79.36, $\alpha$ )	59.83					Adjusted Chi Square Value (79.36, $\beta$ )	56.9
1017					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	1.883					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	1.981
1018												
1019	<b>Lognormal GOF Test on Detected Observations Only</b>											
1020	<b>Not Enough Data to Perform GOF Test</b>											
1021												
1022	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1023					Mean in Original Scale	0.699					Mean in Log Scale	-0.824
1024					SD in Original Scale	0.943					SD in Log Scale	0.873
1025					95% t UCL (assumes normality of ROS data)	1.246					95% Percentile Bootstrap UCL	1.201
1026					95% BCA Bootstrap UCL	1.552					95% Bootstrap t UCL	6.433
1027					95% H-UCL (Log ROS)	1.472						
1028												
1029	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1030					KM Mean (logged)	0.295					KM Geo Mean	1.344
1031					KM SD (logged)	0.293					95% Critical H Value (KM-Log)	1.97
1032					KM Standard Error of Mean (logged)	0.132					95% H-UCL (KM -Log)	1.701
1033					KM SD (logged)	0.293					95% Critical H Value (KM-Log)	1.97
1034					KM Standard Error of Mean (logged)	0.132						
1035												
1036	<b>DL/2 Statistics</b>											
1037	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1038					Mean in Original Scale	0.977					Mean in Log Scale	-0.197
1039					SD in Original Scale	0.816					SD in Log Scale	0.531
1040					95% t UCL (Assumes normality)	1.45					95% H-Stat UCL	1.413
1041	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1042												
1043	<b>Nonparametric Distribution Free UCL Statistics</b>											
1044	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
1045												
1046	<b>Suggested UCL to Use</b>											
1047					95% KM (Chebyshev) UCL	2.594						
1048												
1049	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1050	Recommendations are based upon data size, data distribution, and skewness.											
1051	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1052	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1053												
1054												
1055	<b>Zinc</b>											
1056												
1057	<b>General Statistics</b>											
1058					Total Number of Observations	35					Number of Distinct Observations	34
1059											Number of Missing Observations	0
1060					Minimum	22					Mean	93.19

	A	B	C	D	E	F	G	H	I	J	K	L	
1061					Maximum	284					Median	80.5	
1062					SD	56.41					Std. Error of Mean	9.535	
1063					Coefficient of Variation	0.605					Skewness	1.508	
1064													
1065	<b>Normal GOF Test</b>												
1066					Shapiro Wilk Test Statistic	0.881					<b>Shapiro Wilk GOF Test</b>		
1067					5% Shapiro Wilk Critical Value	0.934					Data Not Normal at 5% Significance Level		
1068					Lilliefors Test Statistic	0.169					<b>Lilliefors GOF Test</b>		
1069					5% Lilliefors Critical Value	0.148					Data Not Normal at 5% Significance Level		
1070	<b>Data Not Normal at 5% Significance Level</b>												
1071													
1072	<b>Assuming Normal Distribution</b>												
1073					<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>		
1074					95% Student's-t UCL	109.3					95% Adjusted-CLT UCL (Chen-1995)	111.5	
1075											95% Modified-t UCL (Johnson-1978)	109.7	
1076													
1077	<b>Gamma GOF Test</b>												
1078					A-D Test Statistic	0.243					<b>Anderson-Darling Gamma GOF Test</b>		
1079					5% A-D Critical Value	0.753					Detected data appear Gamma Distributed at 5% Significance Level		
1080					K-S Test Statistic	0.104					<b>Kolmogorov-Smirnov Gamma GOF Test</b>		
1081					5% K-S Critical Value	0.15					Detected data appear Gamma Distributed at 5% Significance Level		
1082	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
1083													
1084	<b>Gamma Statistics</b>												
1085					k hat (MLE)	3.26					k star (bias corrected MLE)	3	
1086					Theta hat (MLE)	28.59					Theta star (bias corrected MLE)	31.07	
1087					nu hat (MLE)	228.2					nu star (bias corrected)	210	
1088					MLE Mean (bias corrected)	93.19					MLE Sd (bias corrected)	53.81	
1089											Approximate Chi Square Value (0.05)	177.5	
1090					Adjusted Level of Significance	0.0425					Adjusted Chi Square Value	176	
1091													
1092	<b>Assuming Gamma Distribution</b>												
1093					95% Approximate Gamma UCL (use when n>=50)	110.3					95% Adjusted Gamma UCL (use when n<50)	111.2	
1094													
1095	<b>Lognormal GOF Test</b>												
1096					Shapiro Wilk Test Statistic	0.99					<b>Shapiro Wilk Lognormal GOF Test</b>		
1097					5% Shapiro Wilk Critical Value	0.934					Data appear Lognormal at 5% Significance Level		
1098					Lilliefors Test Statistic	0.0658					<b>Lilliefors Lognormal GOF Test</b>		
1099					5% Lilliefors Critical Value	0.148					Data appear Lognormal at 5% Significance Level		
1100	<b>Data appear Lognormal at 5% Significance Level</b>												
1101													
1102	<b>Lognormal Statistics</b>												
1103					Minimum of Logged Data	3.091					Mean of logged Data	4.374	
1104					Maximum of Logged Data	5.649					SD of logged Data	0.579	
1105													
1106	<b>Assuming Lognormal Distribution</b>												
1107					95% H-UCL	114.5					90% Chebyshev (MVUE) UCL	122.3	
1108					95% Chebyshev (MVUE) UCL	135.4					97.5% Chebyshev (MVUE) UCL	153.7	
1109					99% Chebyshev (MVUE) UCL	189.5							
1110													
1111	<b>Nonparametric Distribution Free UCL Statistics</b>												
1112	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
1113													

	A	B	C	D	E	F	G	H	I	J	K	L	
1114	<b>Nonparametric Distribution Free UCLs</b>												
1115	95% CLT UCL				108.9	95% Jackknife UCL				109.3			
1116	95% Standard Bootstrap UCL				108.8	95% Bootstrap-t UCL				114.6			
1117	95% Hall's Bootstrap UCL				115.3	95% Percentile Bootstrap UCL				109.5			
1118	95% BCA Bootstrap UCL				111.5								
1119	90% Chebyshev(Mean, Sd) UCL				121.8	95% Chebyshev(Mean, Sd) UCL				134.8			
1120	97.5% Chebyshev(Mean, Sd) UCL				152.7	99% Chebyshev(Mean, Sd) UCL				188.1			
1121													
1122	<b>Suggested UCL to Use</b>												
1123	95% Adjusted Gamma UCL				111.2								
1124													
1125	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1126	Recommendations are based upon data size, data distribution, and skewness.												
1127	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1128	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
1129													
1130	<b>Aroclor 1260</b>												
1131													
1132	<b>General Statistics</b>												
1133	Total Number of Observations				13	Number of Distinct Observations				13			
1134	Number of Detects				4	Number of Non-Detects				9			
1135	Number of Distinct Detects				4	Number of Distinct Non-Detects				9			
1136	Minimum Detect				0.035	Minimum Non-Detect				0.0247			
1137	Maximum Detect				1.67	Maximum Non-Detect				0.0323			
1138	Variance Detects				0.625	Percent Non-Detects				69.23%			
1139	Mean Detects				0.487	SD Detects				0.791			
1140	Median Detects				0.121	CV Detects				1.625			
1141	Skewness Detects				1.975	Kurtosis Detects				3.913			
1142	Mean of Logged Detects				-1.796	SD of Logged Detects				1.66			
1143													
1144	<b>Normal GOF Test on Detects Only</b>												
1145	Shapiro Wilk Test Statistic				0.689	<b>Shapiro Wilk GOF Test</b>							
1146	5% Shapiro Wilk Critical Value				0.748	Detected Data Not Normal at 5% Significance Level							
1147	Lilliefors Test Statistic				0.41	<b>Lilliefors GOF Test</b>							
1148	5% Lilliefors Critical Value				0.375	Detected Data Not Normal at 5% Significance Level							
1149	<b>Detected Data Not Normal at 5% Significance Level</b>												
1150													
1151	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
1152	KM Mean				0.167	KM Standard Error of Mean				0.139			
1153	KM SD				0.436	95% KM (BCA) UCL				N/A			
1154	95% KM (t) UCL				0.415	95% KM (Percentile Bootstrap) UCL				N/A			
1155	95% KM (z) UCL				0.396	95% KM Bootstrap t UCL				N/A			
1156	90% KM Chebyshev UCL				0.585	95% KM Chebyshev UCL				0.775			
1157	97.5% KM Chebyshev UCL				1.038	99% KM Chebyshev UCL				1.555			
1158													
1159	<b>Gamma GOF Tests on Detected Observations Only</b>												
1160	A-D Test Statistic				0.481	<b>Anderson-Darling GOF Test</b>							
1161	5% A-D Critical Value				0.678	Detected data appear Gamma Distributed at 5% Significance Level							
1162	K-S Test Statistic				0.348	<b>Kolmogorov-Smirnov GOF</b>							
1163	5% K-S Critical Value				0.409	Detected data appear Gamma Distributed at 5% Significance Level							
1164	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
1165													
1166	<b>Gamma Statistics on Detected Data Only</b>												

	A	B	C	D	E	F	G	H	I	J	K	L
1167					k hat (MLE)	0.578				k star (bias corrected MLE)		0.311
1168					Theta hat (MLE)	0.842				Theta star (bias corrected MLE)		1.564
1169					nu hat (MLE)	4.621				nu star (bias corrected)		2.488
1170					Mean (detects)	0.487						
1171												
1172	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1173	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1174	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1175	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1176	This is especially true when the sample size is small.											
1177	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1178					Minimum	0.01				Mean		0.157
1179					Maximum	1.67				Median		0.01
1180					SD	0.457				CV		2.917
1181					k hat (MLE)	0.355				k star (bias corrected MLE)		0.325
1182					Theta hat (MLE)	0.441				Theta star (bias corrected MLE)		0.482
1183					nu hat (MLE)	9.242				nu star (bias corrected)		8.443
1184					Adjusted Level of Significance ( $\beta$ )	0.0301						
1185					Approximate Chi Square Value (8.44, $\alpha$ )	2.994				Adjusted Chi Square Value (8.44, $\beta$ )		2.551
1186					95% Gamma Approximate UCL (use when $n \geq 50$ )	0.442				95% Gamma Adjusted UCL (use when $n < 50$ )		N/A
1187												
1188	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1189					Mean (KM)	0.167				SD (KM)		0.436
1190					Variance (KM)	0.19				SE of Mean (KM)		0.139
1191					k hat (KM)	0.147				k star (KM)		0.164
1192					nu hat (KM)	3.813				nu star (KM)		4.266
1193					theta hat (KM)	1.137				theta star (KM)		1.016
1194					80% gamma percentile (KM)	0.195				90% gamma percentile (KM)		0.5
1195					95% gamma percentile (KM)	0.901				99% gamma percentile (KM)		2.046
1196												
1197	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1198					Approximate Chi Square Value (4.27, $\alpha$ )	0.83				Adjusted Chi Square Value (4.27, $\beta$ )		0.641
1199					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.858				95% Gamma Adjusted KM-UCL (use when $n < 50$ )		1.11
1200												
1201	<b>Lognormal GOF Test on Detected Observations Only</b>											
1202					Shapiro Wilk Test Statistic	0.928				<b>Shapiro Wilk GOF Test</b>		
1203					5% Shapiro Wilk Critical Value	0.748				Detected Data appear Lognormal at 5% Significance Level		
1204					Lilliefors Test Statistic	0.259				<b>Lilliefors GOF Test</b>		
1205					5% Lilliefors Critical Value	0.375				Detected Data appear Lognormal at 5% Significance Level		
1206	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1207												
1208	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1209					Mean in Original Scale	0.15				Mean in Log Scale		-6.301
1210					SD in Original Scale	0.459				SD in Log Scale		3.234
1211					95% t UCL (assumes normality of ROS data)	0.377				95% Percentile Bootstrap UCL		0.398
1212					95% BCA Bootstrap UCL	0.529				95% Bootstrap t UCL		2.884
1213					95% H-UCL (Log ROS)	361.4						
1214												
1215	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1216					KM Mean (logged)	-3.115				KM Geo Mean		0.0444
1217					KM SD (logged)	1.187				95% Critical H Value (KM-Log)		3.182
1218					KM Standard Error of Mean (logged)	0.38				95% H-UCL (KM -Log)		0.267
1219					KM SD (logged)	1.187				95% Critical H Value (KM-Log)		3.182

	A	B	C	D	E	F	G	H	I	J	K	L
1220	KM Standard Error of Mean (logged)					0.38						
1221												
1222	<b>DL/2 Statistics</b>											
1223	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1224	Mean in Original Scale					0.16	Mean in Log Scale					-3.5
1225	SD in Original Scale					0.456	SD in Log Scale					1.447
1226	95% t UCL (Assumes normality)					0.385	95% H-Stat UCL					0.399
1227	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1228												
1229	<b>Nonparametric Distribution Free UCL Statistics</b>											
1230	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1231												
1232	<b>Suggested UCL to Use</b>											
1233	95% KM Bootstrap t UCL				N/A	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					1.11	
1234												
1235	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1236	Recommendations are based upon data size, data distribution, and skewness.											
1237	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1238	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1239												
1240	<b>Benzo(a)anthracene</b>											
1241												
1242	<b>General Statistics</b>											
1243	Total Number of Observations				35	Number of Distinct Observations				28		
1244	Number of Detects				27	Number of Non-Detects				8		
1245	Number of Distinct Detects				23	Number of Distinct Non-Detects				7		
1246	Minimum Detect				0.044	Minimum Non-Detect				0.269		
1247	Maximum Detect				2.5	Maximum Non-Detect				0.325		
1248	Variance Detects				0.219	Percent Non-Detects				22.86%		
1249	Mean Detects				0.367	SD Detects				0.468		
1250	Median Detects				0.22	CV Detects				1.273		
1251	Skewness Detects				3.919	Kurtosis Detects				17.68		
1252	Mean of Logged Detects				-1.389	SD of Logged Detects				0.824		
1253												
1254	<b>Normal GOF Test on Detects Only</b>											
1255	Shapiro Wilk Test Statistic				0.549	<b>Shapiro Wilk GOF Test</b>						
1256	5% Shapiro Wilk Critical Value				0.923	Detected Data Not Normal at 5% Significance Level						
1257	Lilliefors Test Statistic				0.245	<b>Lilliefors GOF Test</b>						
1258	5% Lilliefors Critical Value				0.167	Detected Data Not Normal at 5% Significance Level						
1259	<b>Detected Data Not Normal at 5% Significance Level</b>											
1260												
1261	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1262	KM Mean				0.321	KM Standard Error of Mean				0.0714		
1263	KM SD				0.413	95% KM (BCA) UCL				0.448		
1264	95% KM (t) UCL				0.442	95% KM (Percentile Bootstrap) UCL				0.448		
1265	95% KM (z) UCL				0.438	95% KM Bootstrap t UCL				0.585		
1266	90% KM Chebyshev UCL				0.535	95% KM Chebyshev UCL				0.632		
1267	97.5% KM Chebyshev UCL				0.767	99% KM Chebyshev UCL				1.031		
1268												
1269	<b>Gamma GOF Tests on Detected Observations Only</b>											
1270	A-D Test Statistic				0.992	<b>Anderson-Darling GOF Test</b>						
1271	5% A-D Critical Value				0.764	Detected Data Not Gamma Distributed at 5% Significance Level						
1272	K-S Test Statistic				0.161	<b>Kolmogorov-Smirnov GOF</b>						

	A	B	C	D	E	F	G	H	I	J	K	L	
1273	5% K-S Critical Value				0.172	Detected data appear Gamma Distributed at 5% Significance Level							
1274	Detected data follow Appr. Gamma Distribution at 5% Significance Level												
1275													
1276	Gamma Statistics on Detected Data Only												
1277	k hat (MLE)				1.436	k star (bias corrected MLE)				1.301			
1278	Theta hat (MLE)				0.256	Theta star (bias corrected MLE)				0.282			
1279	nu hat (MLE)				77.56	nu star (bias corrected)				70.28			
1280	Mean (detects)				0.367								
1281													
1282	Gamma ROS Statistics using Imputed Non-Detects												
1283	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1284	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1285	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1286	This is especially true when the sample size is small.												
1287	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1288	Minimum				0.0213	Mean				0.308			
1289	Maximum				2.5	Median				0.17			
1290	SD				0.424	CV				1.378			
1291	k hat (MLE)				1.298	k star (bias corrected MLE)				1.206			
1292	Theta hat (MLE)				0.237	Theta star (bias corrected MLE)				0.255			
1293	nu hat (MLE)				90.86	nu star (bias corrected)				84.41			
1294	Adjusted Level of Significance ( $\beta$ )				0.0425								
1295	Approximate Chi Square Value (84.41, $\alpha$ )				64.23	Adjusted Chi Square Value (84.41, $\beta$ )				63.4			
1296	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.405	95% Gamma Adjusted UCL (use when $n < 50$ )				0.41			
1297													
1298	Estimates of Gamma Parameters using KM Estimates												
1299	Mean (KM)				0.321	SD (KM)				0.413			
1300	Variance (KM)				0.171	SE of Mean (KM)				0.0714			
1301	k hat (KM)				0.604	k star (KM)				0.571			
1302	nu hat (KM)				42.25	nu star (KM)				39.96			
1303	theta hat (KM)				0.532	theta star (KM)				0.562			
1304	80% gamma percentile (KM)				0.529	90% gamma percentile (KM)				0.844			
1305	95% gamma percentile (KM)				1.175	99% gamma percentile (KM)				1.981			
1306													
1307	Gamma Kaplan-Meier (KM) Statistics												
1308	Approximate Chi Square Value (39.96, $\alpha$ )				26.48	Adjusted Chi Square Value (39.96, $\beta$ )				25.96			
1309	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.484	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.494			
1310													
1311	Lognormal GOF Test on Detected Observations Only												
1312	Shapiro Wilk Test Statistic				0.968	Shapiro Wilk GOF Test							
1313	5% Shapiro Wilk Critical Value				0.923	Detected Data appear Lognormal at 5% Significance Level							
1314	Lilliefors Test Statistic				0.113	Lilliefors GOF Test							
1315	5% Lilliefors Critical Value				0.167	Detected Data appear Lognormal at 5% Significance Level							
1316	Detected Data appear Lognormal at 5% Significance Level												
1317													
1318	Lognormal ROS Statistics Using Imputed Non-Detects												
1319	Mean in Original Scale				0.32	Mean in Log Scale				-1.489			
1320	SD in Original Scale				0.418	SD in Log Scale				0.747			
1321	95% t UCL (assumes normality of ROS data)				0.44	95% Percentile Bootstrap UCL				0.451			
1322	95% BCA Bootstrap UCL				0.512	95% Bootstrap t UCL				0.592			
1323	95% H-UCL (Log ROS)				0.394								
1324													
1325	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution												

	A	B	C	D	E	F	G	H	I	J	K	L
1326					KM Mean (logged)	-1.504					KM Geo Mean	0.222
1327					KM SD (logged)	0.771					95% Critical H Value (KM-Log)	2.196
1328					KM Standard Error of Mean (logged)	0.14					95% H-UCL (KM -Log)	0.4
1329					KM SD (logged)	0.771					95% Critical H Value (KM-Log)	2.196
1330					KM Standard Error of Mean (logged)	0.14						
1331												
1332	<b>DL/2 Statistics</b>											
1333	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1334					Mean in Original Scale	0.317					Mean in Log Scale	-1.511
1335					SD in Original Scale	0.42					SD in Log Scale	0.756
1336					95% t UCL (Assumes normality)	0.437					95% H-Stat UCL	0.39
1337	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1338												
1339	<b>Nonparametric Distribution Free UCL Statistics</b>											
1340	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											
1341												
1342	<b>Suggested UCL to Use</b>											
1343					95% KM Adjusted Gamma UCL	0.494					95% GROS Adjusted Gamma UCL	0.41
1344												
1345	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1346	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1347												
1348	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1349	Recommendations are based upon data size, data distribution, and skewness.											
1350	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1351	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1352												
1353	<b>Benzo(b)fluoranthene</b>											
1354												
1355	<b>General Statistics</b>											
1356					Total Number of Observations	35					Number of Distinct Observations	30
1357					Number of Detects	27					Number of Non-Detects	8
1358					Number of Distinct Detects	24					Number of Distinct Non-Detects	7
1359					Minimum Detect	0.05					Minimum Non-Detect	0.269
1360					Maximum Detect	2.3					Maximum Non-Detect	0.325
1361					Variance Detects	0.185					Percent Non-Detects	22.86%
1362					Mean Detects	0.401					SD Detects	0.43
1363					Median Detects	0.27					CV Detects	1.072
1364					Skewness Detects	3.523					Kurtosis Detects	15.23
1365					Mean of Logged Detects	-1.257					SD of Logged Detects	0.824
1366												
1367	<b>Normal GOF Test on Detects Only</b>											
1368					Shapiro Wilk Test Statistic	0.629					<b>Shapiro Wilk GOF Test</b>	
1369					5% Shapiro Wilk Critical Value	0.923					Detected Data Not Normal at 5% Significance Level	
1370					Lilliefors Test Statistic	0.207					<b>Lilliefors GOF Test</b>	
1371					5% Lilliefors Critical Value	0.167					Detected Data Not Normal at 5% Significance Level	
1372	<b>Detected Data Not Normal at 5% Significance Level</b>											
1373												
1374	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1375					KM Mean	0.349					KM Standard Error of Mean	0.0666
1376					KM SD	0.384					95% KM (BCA) UCL	0.47
1377					95% KM (t) UCL	0.461					95% KM (Percentile Bootstrap) UCL	0.466
1378					95% KM (z) UCL	0.458					95% KM Bootstrap t UCL	0.561



	A	B	C	D	E	F	G	H	I	J	K	L
1379	90% KM Chebyshev UCL					0.548	95% KM Chebyshev UCL					0.639
1380	97.5% KM Chebyshev UCL					0.764	99% KM Chebyshev UCL					1.011
1381												
1382	<b>Gamma GOF Tests on Detected Observations Only</b>											
1383	A-D Test Statistic					0.449	<b>Anderson-Darling GOF Test</b>					
1384	5% A-D Critical Value					0.762	Detected data appear Gamma Distributed at 5% Significance Level					
1385	K-S Test Statistic					0.109	<b>Kolmogorov-Smirnov GOF</b>					
1386	5% K-S Critical Value					0.171	Detected data appear Gamma Distributed at 5% Significance Level					
1387	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1388												
1389	<b>Gamma Statistics on Detected Data Only</b>											
1390	k hat (MLE)					1.606	k star (bias corrected MLE)					1.453
1391	Theta hat (MLE)					0.25	Theta star (bias corrected MLE)					0.276
1392	nu hat (MLE)					86.75	nu star (bias corrected)					78.44
1393	Mean (detects)					0.401						
1394												
1395	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1396	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1397	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1398	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1399	This is especially true when the sample size is small.											
1400	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1401	Minimum					0.0421	Mean					0.335
1402	Maximum					2.3	Median					0.23
1403	SD					0.396	CV					1.179
1404	k hat (MLE)					1.435	k star (bias corrected MLE)					1.331
1405	Theta hat (MLE)					0.234	Theta star (bias corrected MLE)					0.252
1406	nu hat (MLE)					100.5	nu star (bias corrected)					93.18
1407	Adjusted Level of Significance ( $\beta$ )					0.0425						
1408	Approximate Chi Square Value (93.18, $\alpha$ )					71.92	Adjusted Chi Square Value (93.18, $\beta$ )					71.03
1409	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.435	95% Gamma Adjusted UCL (use when $n < 50$ )					0.44
1410												
1411	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1412	Mean (KM)					0.349	SD (KM)					0.384
1413	Variance (KM)					0.148	SE of Mean (KM)					0.0666
1414	k hat (KM)					0.823	k star (KM)					0.771
1415	nu hat (KM)					57.59	nu star (KM)					53.98
1416	theta hat (KM)					0.424	theta star (KM)					0.452
1417	80% gamma percentile (KM)					0.571	90% gamma percentile (KM)					0.855
1418	95% gamma percentile (KM)					1.146	99% gamma percentile (KM)					1.834
1419												
1420	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1421	Approximate Chi Square Value (53.98, $\alpha$ )					38.1	Adjusted Chi Square Value (53.98, $\beta$ )					37.47
1422	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.494	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.502
1423												
1424	<b>Lognormal GOF Test on Detected Observations Only</b>											
1425	Shapiro Wilk Test Statistic					0.984	<b>Shapiro Wilk GOF Test</b>					
1426	5% Shapiro Wilk Critical Value					0.923	Detected Data appear Lognormal at 5% Significance Level					
1427	Lilliefors Test Statistic					0.0773	<b>Lilliefors GOF Test</b>					
1428	5% Lilliefors Critical Value					0.167	Detected Data appear Lognormal at 5% Significance Level					
1429	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1430												
1431	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											

	A	B	C	D	E	F	G	H	I	J	K	L	
1432				Mean in Original Scale		0.346				Mean in Log Scale		-1.386	
1433				SD in Original Scale		0.389				SD in Log Scale		0.762	
1434			95% t UCL (assumes normality of ROS data)			0.458				95% Percentile Bootstrap UCL		0.46	
1435				95% BCA Bootstrap UCL		0.526				95% Bootstrap t UCL		0.567	
1436				95% H-UCL (Log ROS)		0.445							
1437													
1438				<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>									
1439				KM Mean (logged)		-1.397				KM Geo Mean		0.247	
1440				KM SD (logged)		0.791				95% Critical H Value (KM-Log)		2.218	
1441				KM Standard Error of Mean (logged)		0.145				95% H-UCL (KM -Log)		0.457	
1442				KM SD (logged)		0.791				95% Critical H Value (KM-Log)		2.218	
1443				KM Standard Error of Mean (logged)		0.145							
1444													
1445				<b>DL/2 Statistics</b>									
1446				<b>DL/2 Normal</b>				<b>DL/2 Log-Transformed</b>					
1447				Mean in Original Scale		0.343				Mean in Log Scale		-1.409	
1448				SD in Original Scale		0.391				SD in Log Scale		0.775	
1449				95% t UCL (Assumes normality)		0.454				95% H-Stat UCL		0.442	
1450				<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>									
1451													
1452				<b>Nonparametric Distribution Free UCL Statistics</b>									
1453				<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>									
1454													
1455				<b>Suggested UCL to Use</b>									
1456				95% KM Adjusted Gamma UCL		0.502				95% GROS Adjusted Gamma UCL		0.44	
1457													
1458				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
1459				Recommendations are based upon data size, data distribution, and skewness.									
1460				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).									
1461				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.									
1462													
1463				<b>Benzo(k)fluoranthene</b>									
1464													
1465				<b>General Statistics</b>									
1466				Total Number of Observations		33				Number of Distinct Observations		27	
1467				Number of Detects		25				Number of Non-Detects		8	
1468				Number of Distinct Detects		21				Number of Distinct Non-Detects		7	
1469				Minimum Detect		0.038				Minimum Non-Detect		0.269	
1470				Maximum Detect		1.5				Maximum Non-Detect		0.325	
1471				Variance Detects		0.104				Percent Non-Detects		24.24%	
1472				Mean Detects		0.325				SD Detects		0.322	
1473				Median Detects		0.19				CV Detects		0.992	
1474				Skewness Detects		2.298				Kurtosis Detects		6.636	
1475				Mean of Logged Detects		-1.501				SD of Logged Detects		0.882	
1476													
1477				<b>Normal GOF Test on Detects Only</b>									
1478				Shapiro Wilk Test Statistic		0.746				<b>Shapiro Wilk GOF Test</b>			
1479				5% Shapiro Wilk Critical Value		0.918				Detected Data Not Normal at 5% Significance Level			
1480				Lilliefors Test Statistic		0.228				<b>Lilliefors GOF Test</b>			
1481				5% Lilliefors Critical Value		0.173				Detected Data Not Normal at 5% Significance Level			
1482				<b>Detected Data Not Normal at 5% Significance Level</b>									
1483													
1484				<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>									

	A	B	C	D	E	F	G	H	I	J	K	L
1485					KM Mean	0.282					KM Standard Error of Mean	0.0514
1486					KM SD	0.287					95% KM (BCA) UCL	0.375
1487					95% KM (t) UCL	0.369					95% KM (Percentile Bootstrap) UCL	0.367
1488					95% KM (z) UCL	0.366					95% KM Bootstrap t UCL	0.419
1489					90% KM Chebyshev UCL	0.436					95% KM Chebyshev UCL	0.506
1490					97.5% KM Chebyshev UCL	0.603					99% KM Chebyshev UCL	0.793
1491												
1492	<b>Gamma GOF Tests on Detected Observations Only</b>											
1493					A-D Test Statistic	0.641					<b>Anderson-Darling GOF Test</b>	
1494					5% A-D Critical Value	0.762					Detected data appear Gamma Distributed at 5% Significance Level	
1495					K-S Test Statistic	0.163					<b>Kolmogorov-Smirnov GOF</b>	
1496					5% K-S Critical Value	0.178					Detected data appear Gamma Distributed at 5% Significance Level	
1497	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1498												
1499	<b>Gamma Statistics on Detected Data Only</b>											
1500					k hat (MLE)	1.473					k star (bias corrected MLE)	1.323
1501					Theta hat (MLE)	0.221					Theta star (bias corrected MLE)	0.246
1502					nu hat (MLE)	73.64					nu star (bias corrected)	66.14
1503					Mean (detects)	0.325						
1504												
1505	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1506	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1507	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1508	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1509	This is especially true when the sample size is small.											
1510	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1511					Minimum	0.038					Mean	0.278
1512					Maximum	1.5					Median	0.18
1513					SD	0.292					CV	1.053
1514					k hat (MLE)	1.531					k star (bias corrected MLE)	1.412
1515					Theta hat (MLE)	0.181					Theta star (bias corrected MLE)	0.197
1516					nu hat (MLE)	101.1					nu star (bias corrected)	93.2
1517					Adjusted Level of Significance ( $\beta$ )	0.0419						
1518					Approximate Chi Square Value (93.20, $\alpha$ )	71.94					Adjusted Chi Square Value (93.20, $\beta$ )	70.98
1519					95% Gamma Approximate UCL (use when $n \geq 50$ )	0.36					95% Gamma Adjusted UCL (use when $n < 50$ )	0.364
1520												
1521	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1522					Mean (KM)	0.282					SD (KM)	0.287
1523					Variance (KM)	0.0823					SE of Mean (KM)	0.0514
1524					k hat (KM)	0.965					k star (KM)	0.898
1525					nu hat (KM)	63.71					nu star (KM)	59.26
1526					theta hat (KM)	0.292					theta star (KM)	0.314
1527					80% gamma percentile (KM)	0.457					90% gamma percentile (KM)	0.666
1528					95% gamma percentile (KM)	0.877					99% gamma percentile (KM)	1.371
1529												
1530	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1531					Approximate Chi Square Value (59.26, $\alpha$ )	42.56					Adjusted Chi Square Value (59.26, $\beta$ )	41.83
1532					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.392					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	0.399
1533												
1534	<b>Lognormal GOF Test on Detected Observations Only</b>											
1535					Shapiro Wilk Test Statistic	0.976					<b>Shapiro Wilk GOF Test</b>	
1536					5% Shapiro Wilk Critical Value	0.918					Detected Data appear Lognormal at 5% Significance Level	
1537					Lilliefors Test Statistic	0.133					<b>Lilliefors GOF Test</b>	

	A	B	C	D	E	F	G	H	I	J	K	L
1538	5% Lilliefors Critical Value				0.173	Detected Data appear Lognormal at 5% Significance Level						
1539	Detected Data appear Lognormal at 5% Significance Level											
1540												
1541	Lognormal ROS Statistics Using Imputed Non-Detects											
1542	Mean in Original Scale				0.281	Mean in Log Scale				-1.607		
1543	SD in Original Scale				0.29	SD in Log Scale				0.791		
1544	95% t UCL (assumes normality of ROS data)				0.367	95% Percentile Bootstrap UCL				0.366		
1545	95% BCA Bootstrap UCL				0.398	95% Bootstrap t UCL				0.421		
1546	95% H-UCL (Log ROS)				0.373							
1547												
1548	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1549	KM Mean (logged)				-1.629	KM Geo Mean				0.196		
1550	KM SD (logged)				0.824	95% Critical H Value (KM-Log)				2.24		
1551	KM Standard Error of Mean (logged)				0.156	95% H-UCL (KM -Log)				0.382		
1552	KM SD (logged)				0.824	95% Critical H Value (KM-Log)				2.24		
1553	KM Standard Error of Mean (logged)				0.156							
1554												
1555	DL/2 Statistics											
1556	DL/2 Normal						DL/2 Log-Transformed					
1557	Mean in Original Scale				0.282	Mean in Log Scale				-1.603		
1558	SD in Original Scale				0.29	SD in Log Scale				0.786		
1559	95% t UCL (Assumes normality)				0.367	95% H-Stat UCL				0.372		
1560	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1561												
1562	Nonparametric Distribution Free UCL Statistics											
1563	Detected Data appear Gamma Distributed at 5% Significance Level											
1564												
1565	Suggested UCL to Use											
1566	95% KM Adjusted Gamma UCL				0.399	95% GROS Adjusted Gamma UCL				0.364		
1567												
1568	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1569	Recommendations are based upon data size, data distribution, and skewness.											
1570	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1571	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1572												
1573	Benzo(a)pyrene											
1574												
1575	General Statistics											
1576	Total Number of Observations				34	Number of Distinct Observations				29		
1577	Number of Detects				26	Number of Non-Detects				8		
1578	Number of Distinct Detects				24	Number of Distinct Non-Detects				7		
1579	Minimum Detect				0.038	Minimum Non-Detect				0.269		
1580	Maximum Detect				0.643	Maximum Non-Detect				0.325		
1581	Variance Detects				0.0303	Percent Non-Detects				23.53%		
1582	Mean Detects				0.254	SD Detects				0.174		
1583	Median Detects				0.195	CV Detects				0.685		
1584	Skewness Detects				1.017	Kurtosis Detects				0.0934		
1585	Mean of Logged Detects				-1.604	SD of Logged Detects				0.725		
1586												
1587	Normal GOF Test on Detects Only											
1588	Shapiro Wilk Test Statistic				0.884	Shapiro Wilk GOF Test						
1589	5% Shapiro Wilk Critical Value				0.92	Detected Data Not Normal at 5% Significance Level						
1590	Lilliefors Test Statistic				0.177	Lilliefors GOF Test						

	A	B	C	D	E	F	G	H	I	J	K	L
1591	5% Lilliefors Critical Value					0.17	Detected Data Not Normal at 5% Significance Level					
1592	<b>Detected Data Not Normal at 5% Significance Level</b>											
1593												
1594	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1595	KM Mean					0.231	KM Standard Error of Mean					0.0285
1596	KM SD					0.159	95% KM (BCA) UCL					0.279
1597	95% KM (t) UCL					0.279	95% KM (Percentile Bootstrap) UCL					0.278
1598	95% KM (z) UCL					0.278	95% KM Bootstrap t UCL					0.287
1599	90% KM Chebyshev UCL					0.316	95% KM Chebyshev UCL					0.355
1600	97.5% KM Chebyshev UCL					0.409	99% KM Chebyshev UCL					0.515
1601												
1602	<b>Gamma GOF Tests on Detected Observations Only</b>											
1603	A-D Test Statistic					0.242	<b>Anderson-Darling GOF Test</b>					
1604	5% A-D Critical Value					0.755	Detected data appear Gamma Distributed at 5% Significance Level					
1605	K-S Test Statistic					0.0987	<b>Kolmogorov-Smirnov GOF</b>					
1606	5% K-S Critical Value					0.173	Detected data appear Gamma Distributed at 5% Significance Level					
1607	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1608												
1609	<b>Gamma Statistics on Detected Data Only</b>											
1610	k hat (MLE)					2.291	k star (bias corrected MLE)					2.052
1611	Theta hat (MLE)					0.111	Theta star (bias corrected MLE)					0.124
1612	nu hat (MLE)					119.1	nu star (bias corrected)					106.7
1613	Mean (detects)					0.254						
1614												
1615	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1616	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1617	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1618	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1619	This is especially true when the sample size is small.											
1620	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1621	Minimum					0.038	Mean					0.23
1622	Maximum					0.643	Median					0.165
1623	SD					0.158	CV					0.688
1624	k hat (MLE)					2.615	k star (bias corrected MLE)					2.404
1625	Theta hat (MLE)					0.088	Theta star (bias corrected MLE)					0.0957
1626	nu hat (MLE)					177.8	nu star (bias corrected)					163.4
1627	Adjusted Level of Significance ( $\beta$ )					0.0422						
1628	Approximate Chi Square Value (163.44, $\alpha$ )					134.9	Adjusted Chi Square Value (163.44, $\beta$ )					133.6
1629	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.279	95% Gamma Adjusted UCL (use when $n < 50$ )					0.281
1630												
1631	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1632	Mean (KM)					0.231	SD (KM)					0.159
1633	Variance (KM)					0.0252	SE of Mean (KM)					0.0285
1634	k hat (KM)					2.115	k star (KM)					1.948
1635	nu hat (KM)					143.8	nu star (KM)					132.4
1636	theta hat (KM)					0.109	theta star (KM)					0.118
1637	80% gamma percentile (KM)					0.346	90% gamma percentile (KM)					0.451
1638	95% gamma percentile (KM)					0.552	99% gamma percentile (KM)					0.775
1639												
1640	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1641	Approximate Chi Square Value (132.45, $\alpha$ )					106.9	Adjusted Chi Square Value (132.45, $\beta$ )					105.7
1642	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.286	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.289
1643												

	A	B	C	D	E	F	G	H	I	J	K	L
1644	<b>Lognormal GOF Test on Detected Observations Only</b>											
1645	Shapiro Wilk Test Statistic				0.978		<b>Shapiro Wilk GOF Test</b>					
1646	5% Shapiro Wilk Critical Value				0.92		Detected Data appear Lognormal at 5% Significance Level					
1647	Lilliefors Test Statistic				0.0615		<b>Lilliefors GOF Test</b>					
1648	5% Lilliefors Critical Value				0.17		Detected Data appear Lognormal at 5% Significance Level					
1649	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1650												
1651	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1652	Mean in Original Scale				0.228		Mean in Log Scale				-1.682	
1653	SD in Original Scale				0.159		SD in Log Scale				0.65	
1654	95% t UCL (assumes normality of ROS data)				0.275		95% Percentile Bootstrap UCL				0.276	
1655	95% BCA Bootstrap UCL				0.281		95% Bootstrap t UCL				0.286	
1656	95% H-UCL (Log ROS)				0.29							
1657												
1658	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1659	KM Mean (logged)				-1.693		KM Geo Mean				0.184	
1660	KM SD (logged)				0.688		95% Critical H Value (KM-Log)				2.107	
1661	KM Standard Error of Mean (logged)				0.131		95% H-UCL (KM -Log)				0.3	
1662	KM SD (logged)				0.688		95% Critical H Value (KM-Log)				2.107	
1663	KM Standard Error of Mean (logged)				0.131							
1664												
1665	<b>DL/2 Statistics</b>											
1666	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1667	Mean in Original Scale				0.229		Mean in Log Scale				-1.679	
1668	SD in Original Scale				0.159		SD in Log Scale				0.646	
1669	95% t UCL (Assumes normality)				0.275		95% H-Stat UCL				0.29	
1670	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1671												
1672	<b>Nonparametric Distribution Free UCL Statistics</b>											
1673	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1674												
1675	<b>Suggested UCL to Use</b>											
1676	95% KM Adjusted Gamma UCL				0.289		95% GROS Adjusted Gamma UCL				0.281	
1677												
1678	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1679	Recommendations are based upon data size, data distribution, and skewness.											
1680	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1681	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1682												
1683	<b>Chrysene</b>											
1684												
1685	<b>General Statistics</b>											
1686	Total Number of Observations				35		Number of Distinct Observations				29	
1687	Number of Detects				27		Number of Non-Detects				8	
1688	Number of Distinct Detects				23		Number of Distinct Non-Detects				7	
1689	Minimum Detect				0.049		Minimum Non-Detect				0.269	
1690	Maximum Detect				2.7		Maximum Non-Detect				0.325	
1691	Variance Detects				0.25		Percent Non-Detects				22.86%	
1692	Mean Detects				0.42		SD Detects				0.5	
1693	Median Detects				0.26		CV Detects				1.19	
1694	Skewness Detects				3.915		Kurtosis Detects				17.7	
1695	Mean of Logged Detects				-1.211		SD of Logged Detects				0.783	
1696												

	A	B	C	D	E	F	G	H	I	J	K	L
1697	<b>Normal GOF Test on Detects Only</b>											
1698	Shapiro Wilk Test Statistic					0.555	<b>Shapiro Wilk GOF Test</b>					
1699	5% Shapiro Wilk Critical Value					0.923	Detected Data Not Normal at 5% Significance Level					
1700	Lilliefors Test Statistic					0.235	<b>Lilliefors GOF Test</b>					
1701	5% Lilliefors Critical Value					0.167	Detected Data Not Normal at 5% Significance Level					
1702	<b>Detected Data Not Normal at 5% Significance Level</b>											
1703												
1704	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1705	KM Mean					0.367	KM Standard Error of Mean					0.0765
1706	KM SD					0.443	95% KM (BCA) UCL					0.504
1707	95% KM (t) UCL					0.496	95% KM (Percentile Bootstrap) UCL					0.505
1708	95% KM (z) UCL					0.493	95% KM Bootstrap t UCL					0.653
1709	90% KM Chebyshev UCL					0.596	95% KM Chebyshev UCL					0.7
1710	97.5% KM Chebyshev UCL					0.844	99% KM Chebyshev UCL					1.128
1711												
1712	<b>Gamma GOF Tests on Detected Observations Only</b>											
1713	A-D Test Statistic					0.978	<b>Anderson-Darling GOF Test</b>					
1714	5% A-D Critical Value					0.762	Detected Data Not Gamma Distributed at 5% Significance Level					
1715	K-S Test Statistic					0.145	<b>Kolmogorov-Smirnov GOF</b>					
1716	5% K-S Critical Value					0.171	Detected data appear Gamma Distributed at 5% Significance Level					
1717	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1718												
1719	<b>Gamma Statistics on Detected Data Only</b>											
1720	k hat (MLE)					1.601	k star (bias corrected MLE)					1.448
1721	Theta hat (MLE)					0.262	Theta star (bias corrected MLE)					0.29
1722	nu hat (MLE)					86.46	nu star (bias corrected)					78.18
1723	Mean (detects)					0.42						
1724												
1725	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1726	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1727	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1728	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1729	This is especially true when the sample size is small.											
1730	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1731	Minimum					0.0251	Mean					0.35
1732	Maximum					2.7	Median					0.22
1733	SD					0.457	CV					1.305
1734	k hat (MLE)					1.372	k star (bias corrected MLE)					1.273
1735	Theta hat (MLE)					0.255	Theta star (bias corrected MLE)					0.275
1736	nu hat (MLE)					96.03	nu star (bias corrected)					89.13
1737	Adjusted Level of Significance ( $\beta$ )					0.0425						
1738	Approximate Chi Square Value (89.13, $\alpha$ )					68.37	Adjusted Chi Square Value (89.13, $\beta$ )					67.5
1739	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.456	95% Gamma Adjusted UCL (use when $n < 50$ )					0.462
1740												
1741	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1742	Mean (KM)					0.367	SD (KM)					0.443
1743	Variance (KM)					0.196	SE of Mean (KM)					0.0765
1744	k hat (KM)					0.687	k star (KM)					0.647
1745	nu hat (KM)					48.07	nu star (KM)					45.28
1746	theta hat (KM)					0.534	theta star (KM)					0.567
1747	80% gamma percentile (KM)					0.604	90% gamma percentile (KM)					0.938
1748	95% gamma percentile (KM)					1.284	99% gamma percentile (KM)					2.118
1749												

	A	B	C	D	E	F	G	H	I	J	K	L
1750	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1751	Approximate Chi Square Value (45.28, $\alpha$ )					30.84	Adjusted Chi Square Value (45.28, $\beta$ )					30.28
1752	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.538	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.548
1753												
1754	<b>Lognormal GOF Test on Detected Observations Only</b>											
1755	Shapiro Wilk Test Statistic					0.965	<b>Shapiro Wilk GOF Test</b>					
1756	5% Shapiro Wilk Critical Value					0.923	Detected Data appear Lognormal at 5% Significance Level					
1757	Lilliefors Test Statistic					0.117	<b>Lilliefors GOF Test</b>					
1758	5% Lilliefors Critical Value					0.167	Detected Data appear Lognormal at 5% Significance Level					
1759	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1760												
1761	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1762	Mean in Original Scale					0.366	Mean in Log Scale					-1.325
1763	SD in Original Scale					0.449	SD in Log Scale					0.72
1764	95% t UCL (assumes normality of ROS data)					0.494	95% Percentile Bootstrap UCL					0.501
1765	95% BCA Bootstrap UCL					0.57	95% Bootstrap t UCL					0.665
1766	95% H-UCL (Log ROS)					0.449						
1767												
1768	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1769	KM Mean (logged)					-1.334	KM Geo Mean					0.263
1770	KM SD (logged)					0.741	95% Critical H Value (KM-Log)					2.165
1771	KM Standard Error of Mean (logged)					0.135	95% H-UCL (KM -Log)					0.456
1772	KM SD (logged)					0.741	95% Critical H Value (KM-Log)					2.165
1773	KM Standard Error of Mean (logged)					0.135						
1774												
1775	<b>DL/2 Statistics</b>											
1776	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1777	Mean in Original Scale					0.357	Mean in Log Scale					-1.374
1778	SD in Original Scale					0.452	SD in Log Scale					0.75
1779	95% t UCL (Assumes normality)					0.487	95% H-Stat UCL					0.443
1780	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1781												
1782	<b>Nonparametric Distribution Free UCL Statistics</b>											
1783	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											
1784												
1785	<b>Suggested UCL to Use</b>											
1786	95% KM Adjusted Gamma UCL					0.548	95% GROS Adjusted Gamma UCL					0.462
1787												
1788	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1789	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1790												
1791	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1792	Recommendations are based upon data size, data distribution, and skewness.											
1793	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1794	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1795												
1796	<b>Dibenz(a,h)anthracene</b>											
1797												
1798	<b>General Statistics</b>											
1799	Total Number of Observations					13	Number of Distinct Observations					13
1800	Number of Detects					3	Number of Non-Detects					10
1801	Number of Distinct Detects					3	Number of Distinct Non-Detects					10
1802	Minimum Detect					0.051	Minimum Non-Detect					0.269



	A	B	C	D	E	F	G	H	I	J	K	L
1803				Maximum Detects	0.39					Maximum Non-Detects		0.325
1804				Variance Detects	0.0328					Percent Non-Detects		76.92%
1805				Mean Detects	0.184					SD Detects		0.181
1806				Median Detects	0.11					CV Detects		0.986
1807				Skewness Detects	1.528					Kurtosis Detects		N/A
1808				Mean of Logged Detects	-2.042					SD of Logged Detects		1.027
1809												
1810	<b>Warning: Data set has only 3 Detected Values.</b>											
1811	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											
1812												
1813												
1814	<b>Normal GOF Test on Detects Only</b>											
1815				Shapiro Wilk Test Statistic	0.876					<b>Shapiro Wilk GOF Test</b>		
1816				5% Shapiro Wilk Critical Value	0.767					Detected Data appear Normal at 5% Significance Level		
1817				Lilliefors Test Statistic	0.325					<b>Lilliefors GOF Test</b>		
1818				5% Lilliefors Critical Value	0.425					Detected Data appear Normal at 5% Significance Level		
1819	<b>Detected Data appear Normal at 5% Significance Level</b>											
1820												
1821	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1822				KM Mean	0.104					KM Standard Error of Mean		0.0366
1823				KM SD	0.0872					95% KM (BCA) UCL		N/A
1824				95% KM (t) UCL	0.17					95% KM (Percentile Bootstrap) UCL		N/A
1825				95% KM (z) UCL	0.165					95% KM Bootstrap t UCL		N/A
1826				90% KM Chebyshev UCL	0.214					95% KM Chebyshev UCL		0.264
1827				97.5% KM Chebyshev UCL	0.333					99% KM Chebyshev UCL		0.469
1828												
1829	<b>Gamma GOF Tests on Detected Observations Only</b>											
1830	<b>Not Enough Data to Perform GOF Test</b>											
1831												
1832	<b>Gamma Statistics on Detected Data Only</b>											
1833				k hat (MLE)	1.587					k star (bias corrected MLE)		N/A
1834				Theta hat (MLE)	0.116					Theta star (bias corrected MLE)		N/A
1835				nu hat (MLE)	9.523					nu star (bias corrected)		N/A
1836				Mean (detects)	0.184							
1837												
1838	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1839	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1840	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1841	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1842	This is especially true when the sample size is small.											
1843	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1844				Minimum	0.051					Mean		0.102
1845				Maximum	0.39					Median		0.0778
1846				SD	0.0873					CV		0.854
1847				k hat (MLE)	3.386					k star (bias corrected MLE)		2.656
1848				Theta hat (MLE)	0.0302					Theta star (bias corrected MLE)		0.0385
1849				nu hat (MLE)	88.03					nu star (bias corrected)		69.05
1850				Adjusted Level of Significance ( $\beta$ )	0.0301							
1851				Approximate Chi Square Value (69.05, $\alpha$ )	50.92					Adjusted Chi Square Value (69.05, $\beta$ )		48.71
1852				95% Gamma Approximate UCL (use when $n \geq 50$ )	0.139					95% Gamma Adjusted UCL (use when $n < 50$ )		N/A
1853												
1854	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1855				Mean (KM)	0.104					SD (KM)		0.0872

	A	B	C	D	E	F	G	H	I	J	K	L
1856					Variance (KM)	0.0076					SE of Mean (KM)	0.0366
1857					k hat (KM)	1.431					k star (KM)	1.152
1858					nu hat (KM)	37.2					nu star (KM)	29.95
1859					theta hat (KM)	0.0729					theta star (KM)	0.0906
1860					80% gamma percentile (KM)	0.166					90% gamma percentile (KM)	0.232
1861					95% gamma percentile (KM)	0.297					99% gamma percentile (KM)	0.448
1862												
1863	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1864	Approximate Chi Square Value (29.95, $\alpha$ )					18.45	Adjusted Chi Square Value (29.95, $\beta$ )					17.17
1865	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.169	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.182
1866												
1867	<b>Lognormal GOF Test on Detected Observations Only</b>											
1868	Shapiro Wilk Test Statistic					0.98	<b>Shapiro Wilk GOF Test</b>					
1869	5% Shapiro Wilk Critical Value					0.767	Detected Data appear Lognormal at 5% Significance Level					
1870	Lilliefors Test Statistic					0.231	<b>Lilliefors GOF Test</b>					
1871	5% Lilliefors Critical Value					0.425	Detected Data appear Lognormal at 5% Significance Level					
1872	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1873												
1874	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1875	Mean in Original Scale					0.1	Mean in Log Scale					-2.464
1876	SD in Original Scale					0.088	SD in Log Scale					0.484
1877	95% t UCL (assumes normality of ROS data)					0.144	95% Percentile Bootstrap UCL					N/A
1878	95% BCA Bootstrap UCL					N/A	95% Bootstrap t UCL					N/A
1879	95% H-UCL (Log ROS)					0.128						
1880												
1881	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1882	KM Mean (logged)					-2.465	KM Geo Mean					0.085
1883	KM SD (logged)					0.574	95% Critical H Value (KM-Log)					2.202
1884	KM Standard Error of Mean (logged)					0.342	95% H-UCL (KM -Log)					0.144
1885	KM SD (logged)					0.574	95% Critical H Value (KM-Log)					2.202
1886	KM Standard Error of Mean (logged)					0.342						
1887												
1888	<b>DL/2 Statistics</b>											
1889	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1890	Mean in Original Scale					0.155	Mean in Log Scale					-1.949
1891	SD in Original Scale					0.076	SD in Log Scale					0.426
1892	95% t UCL (Assumes normality)					0.193	95% H-Stat UCL					0.2
1893	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1894												
1895	<b>Nonparametric Distribution Free UCL Statistics</b>											
1896	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>											
1897												
1898	<b>Suggested UCL to Use</b>											
1899	95% KM (t) UCL					0.17						
1900												
1901	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1902	Recommendations are based upon data size, data distribution, and skewness.											
1903	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1904	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1905												
1906	<b>Indeno(1,2,3-cd)pyrene</b>											
1907												
1908	<b>General Statistics</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1909	Total Number of Observations					29	Number of Distinct Observations					27
1910	Number of Detects					21	Number of Non-Detects					8
1911	Number of Distinct Detects					20	Number of Distinct Non-Detects					7
1912	Minimum Detect					0.037	Minimum Non-Detect					0.269
1913	Maximum Detect					0.74	Maximum Non-Detect					0.325
1914	Variance Detects					0.0308	Percent Non-Detects					27.59%
1915	Mean Detects					0.184	SD Detects					0.175
1916	Median Detects					0.13	CV Detects					0.952
1917	Skewness Detects					2.09	Kurtosis Detects					4.38
1918	Mean of Logged Detects					-2.008	SD of Logged Detects					0.775
1919												
1920	<b>Normal GOF Test on Detects Only</b>											
1921	Shapiro Wilk Test Statistic					0.734	<b>Shapiro Wilk GOF Test</b>					
1922	5% Shapiro Wilk Critical Value					0.908	Detected Data Not Normal at 5% Significance Level					
1923	Lilliefors Test Statistic					0.249	<b>Lilliefors GOF Test</b>					
1924	5% Lilliefors Critical Value					0.188	Detected Data Not Normal at 5% Significance Level					
1925	<b>Detected Data Not Normal at 5% Significance Level</b>											
1926												
1927	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1928	KM Mean					0.167	KM Standard Error of Mean					0.0299
1929	KM SD					0.152	95% KM (BCA) UCL					0.219
1930	95% KM (t) UCL					0.217	95% KM (Percentile Bootstrap) UCL					0.221
1931	95% KM (z) UCL					0.216	95% KM Bootstrap t UCL					0.247
1932	90% KM Chebyshev UCL					0.256	95% KM Chebyshev UCL					0.297
1933	97.5% KM Chebyshev UCL					0.353	99% KM Chebyshev UCL					0.464
1934												
1935	<b>Gamma GOF Tests on Detected Observations Only</b>											
1936	A-D Test Statistic					0.772	<b>Anderson-Darling GOF Test</b>					
1937	5% A-D Critical Value					0.756	Detected Data Not Gamma Distributed at 5% Significance Level					
1938	K-S Test Statistic					0.152	<b>Kolmogorov-Smirnov GOF</b>					
1939	5% K-S Critical Value					0.192	Detected data appear Gamma Distributed at 5% Significance Level					
1940	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1941												
1942	<b>Gamma Statistics on Detected Data Only</b>											
1943	k hat (MLE)					1.727	k star (bias corrected MLE)					1.512
1944	Theta hat (MLE)					0.107	Theta star (bias corrected MLE)					0.122
1945	nu hat (MLE)					72.55	nu star (bias corrected)					63.52
1946	Mean (detects)					0.184						
1947												
1948	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1949	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1950	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1951	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1952	This is especially true when the sample size is small.											
1953	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1954	Minimum					0.037	Mean					0.165
1955	Maximum					0.74	Median					0.114
1956	SD					0.152	CV					0.923
1957	k hat (MLE)					2.09	k star (bias corrected MLE)					1.897
1958	Theta hat (MLE)					0.0789	Theta star (bias corrected MLE)					0.087
1959	nu hat (MLE)					121.2	nu star (bias corrected)					110
1960	Adjusted Level of Significance ( $\beta$ )					0.0407						
1961	Approximate Chi Square Value (110.01, $\alpha$ )					86.8	Adjusted Chi Square Value (110.01, $\beta$ )					85.57

	A	B	C	D	E	F	G	H	I	J	K	L
1962	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.209	95% Gamma Adjusted UCL (use when $n < 50$ )					0.212
1963												
1964	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1965	Mean (KM)					0.167	SD (KM)					0.152
1966	Variance (KM)					0.0231	SE of Mean (KM)					0.0299
1967	k hat (KM)					1.2	k star (KM)					1.099
1968	nu hat (KM)					69.59	nu star (KM)					63.73
1969	theta hat (KM)					0.139	theta star (KM)					0.152
1970	80% gamma percentile (KM)					0.266	90% gamma percentile (KM)					0.375
1971	95% gamma percentile (KM)					0.483	99% gamma percentile (KM)					0.732
1972												
1973	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1974	Approximate Chi Square Value (63.73, $\alpha$ )					46.36	Adjusted Chi Square Value (63.73, $\beta$ )					45.48
1975	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.229	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.233
1976												
1977	<b>Lognormal GOF Test on Detected Observations Only</b>											
1978	Shapiro Wilk Test Statistic					0.96	<b>Shapiro Wilk GOF Test</b>					
1979	5% Shapiro Wilk Critical Value					0.908	Detected Data appear Lognormal at 5% Significance Level					
1980	Lilliefors Test Statistic					0.108	<b>Lilliefors GOF Test</b>					
1981	5% Lilliefors Critical Value					0.188	Detected Data appear Lognormal at 5% Significance Level					
1982	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1983												
1984	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1985	Mean in Original Scale					0.165	Mean in Log Scale					-2.058
1986	SD in Original Scale					0.152	SD in Log Scale					0.665
1987	95% t UCL (assumes normality of ROS data)					0.213	95% Percentile Bootstrap UCL					0.215
1988	95% BCA Bootstrap UCL					0.229	95% Bootstrap t UCL					0.25
1989	95% H-UCL (Log ROS)					0.207						
1990												
1991	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1992	KM Mean (logged)					-2.075	KM Geo Mean					0.126
1993	KM SD (logged)					0.708	95% Critical H Value (KM-Log)					2.136
1994	KM Standard Error of Mean (logged)					0.148	95% H-UCL (KM -Log)					0.215
1995	KM SD (logged)					0.708	95% Critical H Value (KM-Log)					2.136
1996	KM Standard Error of Mean (logged)					0.148						
1997												
1998	<b>DL/2 Statistics</b>											
1999	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2000	Mean in Original Scale					0.174	Mean in Log Scale					-1.985
2001	SD in Original Scale					0.149	SD in Log Scale					0.657
2002	95% t UCL (Assumes normality)					0.221	95% H-Stat UCL					0.221
2003	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2004												
2005	<b>Nonparametric Distribution Free UCL Statistics</b>											
2006	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											
2007												
2008	<b>Suggested UCL to Use</b>											
2009	95% KM Adjusted Gamma UCL					0.233	95% GROS Adjusted Gamma UCL					0.212
2010												
2011	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
2012	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
2013												
2014	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											

	A	B	C	D	E	F	G	H	I	J	K	L
2015	Recommendations are based upon data size, data distribution, and skewness.											
2016	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2017	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2018												
2019	<b>NNDP</b>											
2020												
2021	<b>General Statistics</b>											
2022	Total Number of Observations				11		Number of Distinct Observations				11	
2023	Number of Detects				1		Number of Non-Detects				10	
2024	Number of Distinct Detects				1		Number of Distinct Non-Detects				10	
2025												
2026	<b>Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!</b>											
2027	<b>It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).</b>											
2028												
2029	<b>The data set for variable NNDP was not processed!</b>											
2030												
2031												

***Appendix B-3 Area C – South and East of Cottonwood Copse AOC***

# Site-specific Recreator Soil Inputs

Variable	Recreator Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - mass limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - mass limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - mass limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{ent}$	0.43396	0.43396
$\rho_h$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_h$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_c$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{vent}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{vent}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> - mass limit)	68.18	68.18
$A_e$ (PEF acres)	0.5	0.5
$A_e$ (VF acres)	0.5	0.5
$A_e$ (VF mass-limit acres)	0.5	0.5
$AF_{ns}$ (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
$AF_{2.6}$ (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
$AF_{6.16}$ (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
$AF_{16.30}$ (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
$AF_{rec-ad}$ (skin adherence factor - adult) mg/cm <sup>2</sup>	0.07	0.07
$AF_{rec-ch}$ (skin adherence factor - child) mg/cm <sup>2</sup>	0.2	0.2
$AT_{rec}$ (averaging time)	365	365

# Site-specific Recreator Soil Inputs

Variable	Recreator Soil Default Value	Form-input Value
BW <sub>n,r</sub> (body weight) kg	15	15
BW <sub>r,c</sub> (body weight) kg	15	15
BW <sub>r-16</sub> (body weight) kg	80	80
BW <sub>16-20</sub> (body weight) kg	80	80
BW <sub>r-a</sub> (body weight - adult) kg	80	80
BW <sub>r-c</sub> (body weight - child) kg	15	15
DFS <sub>r-adj</sub> (age-adjusted soil dermal factor) mg/kg	.	27767.6
DFS <sub>M,r-adj</sub> (mutagenic age-adjusted soil dermal factor) mg/kg	.	115018.4
ED <sub>r</sub> (exposure duration - recreator) years	26	26
ED <sub>n,r</sub> (exposure duration) year	2	2
ED <sub>r,c</sub> (exposure duration) year	4	4
ED <sub>r-16</sub> (exposure duration) year	10	10
ED <sub>16-20</sub> (exposure duration) year	10	10
ED <sub>r-c</sub> (exposure duration - child) years	6	6
EF <sub>r</sub> (exposure frequency) days/year	.	94
EF <sub>n,r</sub> (exposure frequency) days/year	.	94
EF <sub>r,c</sub> (exposure frequency) days/year	.	94
EF <sub>r-16</sub> (exposure frequency) days/year	.	94
EF <sub>16-20</sub> (exposure frequency) days/year	.	94
EF <sub>r-a</sub> (exposure frequency - adult) days/year	.	94
EF <sub>r-c</sub> (exposure frequency - child) days/year	.	94
ET <sub>r</sub> (exposure time - recreator) hours/day	.	3
ET <sub>n,r</sub> (exposure time) hours/day	.	3
ET <sub>r,c</sub> (exposure time) hours/day	.	3
ET <sub>r-16</sub> (exposure time) hours/day	.	3
ET <sub>16-20</sub> (exposure time) hours/day	.	3
ET <sub>r-a</sub> (adult exposure time) hours/day	.	3
ET <sub>r-c</sub> (child exposure time) hours/day	.	3
THQ (target hazard quotient) unitless	0.1	1
IFS <sub>r-adj</sub> (age-adjusted soil ingestion factor) mg/kg	.	9870
IFSM <sub>rec-adj</sub> (mutagenic age-adjusted soil ingestion factor) mg/kg	.	44806.667



# Site-specific Recreator Soil Inputs

Variable	Recreator Soil Default Value	Form-input Value
IRS <sub>n,r</sub> (soil intake rate) mg/day	200	200
IRS <sub>r,r</sub> (soil intake rate) mg/day	200	200
IRS <sub>r,16</sub> (soil intake rate) mg/day	100	100
IRS <sub>16,30</sub> (soil intake rate) mg/day	100	100
IRS <sub>rec,a</sub> (soil intake rate - adult) mg/day	100	100
IRS <sub>rec,r</sub> (soil intake rate - child) mg/day	200	200
LT (lifetime - recreator) years	70	70
SA <sub>n,r</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>r,r</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>r,16</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>16,30</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>rec,a</sub> (skin surface area - adult) cm <sup>2</sup> /day	6032	6032
SA <sub>rec,r</sub> (skin surface area - child) cm <sup>2</sup> /day	2373	2373
TR (target risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

# Site-specific

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	3.00E-04	A
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-	
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-	
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-	
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-	
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-	
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-	
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-	
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	G	5.00E-05	I
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-	

# Site-specific

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GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref
1	-	1	-	-	-	1.50E+03	-	-		2792.15	CRC89
0.15	-	1	-	-	-	4.50E+01	-	-		1908.15	PHYSROP
1	0.03	0.6	-	-	-	2.90E+01	-	-		888.15	PHYSROP
0.07	-	1	-	-	-	4.10E+01	-	-		1873.15	PHYSROP
1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP
1	0.13	1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP
1	0.13	1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI
1	0.13	1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP
0.025	0.001	1	-	-	-	7.50E+01	-	-		1038.15	PHYSROP
0.013	-	1	-	-	-	1.80E+06	-	-		-	
1	0.13	1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP
1	-	1	-	-	-	4.50E+01	-	-		3200.15	CRC89
1	-	1	-	-	-	3.50E+01	-	-		2868.15	PHYSROP
1	0.13	1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSROP
1	0.13	1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP
0.04	-	1	-	-	-	6.50E+01	-	-		2368.15	PHYSROP
1	-	1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP
1	-	1	-	5.47E+04	-	-	-	-		-	
1	-	1	-	-	-	6.20E+01	-	-		1181.15	PHYSROP

# Site-specific

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Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)
6700	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
5070	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
1673	CRC89	INORGANIC	-	-	-	1.36E+09	-	2.88E+00	2.04E+01	2.64E+04
3572.13	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09	4.41E+06	5.70E+00	1.71E+01	2.21E+03
969.27	EPA 2001 Fact Sheet	PAH	2.55E-02	6.58E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
969.27	EPA 2001 Fact Sheet	PAH	2.50E-02	6.43E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
1019.7	EPA 2001 Fact Sheet	PAH	2.50E-02	6.43E-06	-	1.36E+09	-	5.70E+01	1.71E+02	6.84E+06
2291	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	6.32E+04
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	-	1.36E+09	-	5.70E+02	1.71E+03	6.84E+07
7398.48	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	1.26E+04
5123	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
990.41	EPA 2001 Fact Sheet	PAH	2.36E-02	6.02E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
1078.24	EPA 2001 Fact Sheet	PAH	2.47E-02	6.37E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
4325	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-
3170	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-

# Site-specific

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Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL Child THQ=1 (mg/kg)	Dermal SL Child THQ=1 (mg/kg)	Inhalation SL Child THQ=1 (mg/kg)	Noncarcinogenic SL Child THI=1 (mg/kg)	Ingestion SL Adult THQ=1 (mg/kg)	Dermal SL Adult THQ=1 (mg/kg)	Inhalation SL Adult THQ=1 (mg/kg)	Noncarcinogenic SL Adult THI=1 (mg/kg)	Screening Level (mg/kg)
-	2.91E+05	-	2.11E+08	2.91E+05	3.11E+06	-	2.11E+08	3.06E+06	2.91E+05 nc max
-	1.16E+02	-	1.27E+07	1.16E+02	1.24E+03	-	1.27E+07	1.24E+03	1.16E+02 nc max
2.52E+00	1.46E+02	1.23E+03	6.33E+05	1.30E+02	1.55E+03	7.36E+03	6.33E+05	1.28E+03	2.52E+00 ca max
-	5.82E+04	-	2.11E+07	5.81E+04	6.21E+05	-	2.11E+07	6.04E+05	5.81E+04 nc max
4.27E+00	-	-	-	-	-	-	-	-	4.27E+00 ca max
4.28E-01	8.74E+01	2.83E+02	8.45E+04	6.67E+01	9.32E+02	1.70E+03	8.45E+04	5.97E+02	4.28E-01 ca max
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca max
4.28E+01	-	-	-	-	-	-	-	-	4.28E+01 ca max
6.32E+04	2.91E+02	3.07E+03	4.22E+05	2.66E+02	3.11E+03	1.84E+04	4.22E+05	2.64E+03	2.66E+02 nc max
-	4.37E+05	-	-	4.37E+05	4.66E+06	-	-	4.66E+06	4.37E+05 nc max
4.28E+02	-	-	-	-	-	-	-	-	4.28E+02 ca max
1.26E+04	8.74E+01	-	2.53E+05	8.73E+01	9.32E+02	-	2.53E+05	9.28E+02	8.73E+01 nc max
-	1.16E+04	-	-	1.16E+04	1.24E+05	-	-	1.24E+05	1.16E+04 nc max
4.28E-01	-	-	-	-	-	-	-	-	4.28E-01 ca max
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca max
-	6.99E+03	-	2.11E+06	6.97E+03	7.46E+04	-	2.11E+06	7.20E+04	6.97E+03 nc max
-	-	-	3.23E+02	3.23E+02	-	-	3.23E+02	3.23E+02	3.23E+02 nc sat max
-	5.82E+00	-	-	5.82E+00	6.21E+01	-	-	6.21E+01	5.82E+00 nc sat max
-	8.74E+04	-	-	8.74E+04	9.32E+05	-	-	9.32E+05	8.74E+04 nc sat max

# Site-specific Recreator Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)
Aluminum	-		-		1.00E+00	P	5.00E-03	P	1	-	1	-	-
Antimony (metallic)	-		-		4.00E-04	I	3.00E-04	A	0.15	-	1	-	-
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-
Barium	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1	-	-
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1	-	9.40E-03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1	-	1.50E-03
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1	-	8.00E-04
Cadmium (Diet)	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-
Chromium(III), Insoluble Salts	-		-		1.50E+00	I	-		0.013	-	1	-	-
Chrysene	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1	-	2.00E-03
Cobalt	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-
Copper	-		-		4.00E-02	H	-		1	-	1	-	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1	-	2.49E-03
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1	-	1.90E-04
Manganese (Non-diet)	-		-		2.40E-02	G	5.00E-05	I	0.04	-	1	-	-
Mercury (elemental)	-		-		-		3.00E-04	I	1	-	1	3.13E+00	6.00E-02
Thallium Sulfate	-		-		2.00E-05	X	-		1	-	1	-	5.47E+04
Zinc and Compounds	-		-		3.00E-01	I	-		1	-	1	-	-
<i>*Total Risk/HI</i>	-		-		-		-		-	-	-	-	-

# Site-specific Recreator Risk for Soil

Chemical	K <sub>oc</sub> \ (cm <sup>3</sup> /g)	K <sub>d</sub> \ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type
Aluminum	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC
Antimony (metallic)	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC
Arsenic, Inorganic	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC
Barium	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC
Benz[a]anthracene	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH
Benzo[a]pyrene	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	969.27	EPA 2001 Fact Sheet	PAH
Benzo[b]fluoranthene	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	969.27	EPA 2001 Fact Sheet	PAH
Benzo[k]fluoranthene	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	1019.7	EPA 2001 Fact Sheet	PAH
Cadmium (Diet)	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC
Chromium(III), Insoluble Salts	-	1.80E+06	-	-		-		-		INORGANIC
Chrysene	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH
Cobalt	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC
Copper	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC
Dibenz[a,h]anthracene	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	990.41	EPA 2001 Fact Sheet	PAH
Indeno[1,2,3-cd]pyrene	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	1078.24	EPA 2001 Fact Sheet	PAH
Manganese (Non-diet)	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC
Mercury (elemental)	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC
Thallium Sulfate	-	-	-	-		-		-		INORGANIC
Zinc and Compounds	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC
<i>*Total Risk/HI</i>	-	-	-	-		-		-		

# Site-specific Recreator Risk for Soil

Chemical	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk
Aluminum	-	-	-	1.36E+09	-	1.27E+04	-	-	-	-
Antimony (metallic)	-	-	-	1.36E+09	-	4.60E+00	-	-	-	-
Arsenic, Inorganic	-	-	-	1.36E+09	-	9.30E+00	3.23E-06	4.55E-07	3.52E-10	3.69E-06
Barium	-	-	-	1.36E+09	-	2.37E+02	-	-	-	-
Benz[a]anthracene	2.61E-02	6.75E-06	6.83E-10	1.36E+09	4.41E+06	7.66E-01	1.34E-07	4.48E-08	3.46E-10	1.80E-07
Benzo[a]pyrene	2.55E-02	6.58E-06	-	1.36E+09	-	7.70E-01	1.35E-06	4.51E-07	1.13E-11	1.80E-06
Benzo[b]fluoranthene	2.50E-02	6.43E-06	-	1.36E+09	-	1.00E+00	1.75E-07	5.85E-08	1.46E-12	2.34E-07
Benzo[k]fluoranthene	2.50E-02	6.43E-06	-	1.36E+09	-	5.31E-01	9.31E-09	3.11E-09	7.76E-14	1.24E-08
Cadmium (Diet)	-	-	-	1.36E+09	-	3.85E+00	-	-	6.10E-11	6.10E-11
Chromium(III), Insoluble Salts	-	-	-	1.36E+09	-	6.31E+01	-	-	-	-
Chrysene	2.61E-02	6.75E-06	-	1.36E+09	-	8.26E-01	1.45E-09	4.83E-10	1.21E-14	1.93E-09
Cobalt	-	-	-	1.36E+09	-	4.88E+00	-	-	3.86E-10	3.86E-10
Copper	-	-	-	1.36E+09	-	2.94E+02	-	-	-	-
Dibenz[a,h]anthracene	2.36E-02	6.02E-06	-	1.36E+09	-	1.83E-01	3.21E-07	1.07E-07	2.67E-12	4.28E-07
Indeno[1,2,3-cd]pyrene	2.47E-02	6.37E-06	-	1.36E+09	-	5.11E-01	8.96E-08	2.99E-08	7.47E-13	1.20E-07
Manganese (Non-diet)	-	-	-	1.36E+09	-	1.31E+03	-	-	-	-
Mercury (elemental)	3.07E-02	6.30E-06	1.10E-05	1.36E+09	3.47E+04	3.48E-01	-	-	-	-
Thallium Sulfate	-	-	-	1.36E+09	-	1.85E+00	-	-	-	-
Zinc and Compounds	-	-	-	1.36E+09	-	5.25E+02	-	-	-	-
<i>*Total Risk/HI</i>	-	-	-	-	-	-	5.31E-06	1.15E-06	1.16E-09	6.47E-06



# Site-specific Recreator Risk for Soil

Chemical	Ingestion Child HQ	Dermal Child HQ	Inhalation Child HQ	Noncarcinogenic Child HI	Ingestion Adult HQ	Dermal Adult HQ	Inhalation Adult HQ	Noncarcinogenic Adult HI
Aluminum	4.36E-02	-	6.02E-05	4.37E-02	4.09E-03	-	6.02E-05	4.15E-03
Antimony (metallic)	3.95E-02	-	3.63E-07	3.95E-02	3.70E-03	-	3.63E-07	3.70E-03
Arsenic, Inorganic	6.39E-02	7.58E-03	1.47E-05	7.15E-02	5.99E-03	1.26E-03	1.47E-05	7.27E-03
Barium	4.06E-03	-	1.12E-05	4.08E-03	3.81E-04	-	1.12E-05	3.92E-04
Benz[a]anthracene	-	-	-	-	-	-	-	-
Benzo[a]pyrene	8.81E-03	2.72E-03	9.12E-06	1.15E-02	8.26E-04	4.54E-04	9.12E-06	1.29E-03
Benzo[b]fluoranthene	-	-	-	-	-	-	-	-
Benzo[k]fluoranthene	-	-	-	-	-	-	-	-
Cadmium (Diet)	1.32E-02	1.25E-03	9.12E-06	1.45E-02	1.24E-03	2.09E-04	9.12E-06	1.46E-03
Chromium(III), Insoluble Salts	1.44E-04	-	-	1.44E-04	1.35E-05	-	-	1.35E-05
Chrysene	-	-	-	-	-	-	-	-
Cobalt	5.59E-02	-	1.93E-05	5.59E-02	5.24E-03	-	1.93E-05	5.26E-03
Copper	2.52E-02	-	-	2.52E-02	2.37E-03	-	-	2.37E-03
Dibenz[a,h]anthracene	-	-	-	-	-	-	-	-
Indeno[1,2,3-cd]pyrene	-	-	-	-	-	-	-	-
Manganese (Non-diet)	1.87E-01	-	6.20E-04	1.88E-01	1.75E-02	-	6.20E-04	1.82E-02
Mercury (elemental)	-	-	1.08E-03	1.08E-03	-	-	1.08E-03	1.08E-03
Thallium Sulfate	3.18E-01	-	-	3.18E-01	2.98E-02	-	-	2.98E-02
Zinc and Compounds	6.01E-03	-	-	6.01E-03	5.64E-04	-	-	5.64E-04
<b>*Total Risk/HI</b>	<b>7.65E-01</b>	<b>1.16E-02</b>	<b>1.82E-03</b>	<b>7.78E-01</b>	<b>7.17E-02</b>	<b>1.93E-03</b>	<b>1.82E-03</b>	<b>7.55E-02</b>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{vnl}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{vnl}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-		1	-	1

## Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{10}$ (cm <sup>2</sup> /s)
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-		PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-		PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-		PAH	4.76E-02
-	-	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC	-
-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-

# Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	1.87E+04	1.87E+04	2.35E+02	1.39E+03	1.20E+04	1.98E+02	1.98E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc
-	-	1.36E+09	-	-	-	-	-	7.06E+04	-	-	7.06E+04	7.06E+04 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-	4.50E+01
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05	-
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-	-	7.50E+01
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-	3.50E+01
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06	-
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04	-	-
Zinc and Compounds	-	-	-	-	3.00E-01	I	-	-	1	-	1	-	-	-	6.20E+01
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ib</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-	1.36E+09
Antimony (metallic)	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-	-	-	1.36E+09
Arsenic, Inorganic	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-	-	-	1.36E+09
Barium	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-	-	-	1.36E+09
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Cadmium (Diet)	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-	-	-	1.36E+09
Chromium(III), Insoluble Salts	-	-		-		-		INORGANIC	-	-	-	1.36E+09
Chrysene	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	-	1.36E+09
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-	1.36E+09
Copper	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-	-	-	1.36E+09
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02	5.21E-06	-	1.36E+09
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-		PAH	4.48E-02	5.23E-06	-	1.36E+09
Manganese (Non-diet)	-	-		2368.15	PHYSROP	4325	CRC89	INORGANIC	-	-	-	1.36E+09
Mercury (elemental)	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09
Thallium Sulfate	-	-		-		-		INORGANIC	-	-	-	1.36E+09
Zinc and Compounds	-	-		1181.15	PHYSROP	3170	YAWS	INORGANIC	-	-	-	1.36E+09
<i>*Total Risk/HI</i>	-	-		-		-			-	-	-	-



# Site-specific Outdoor Worker Risk for Soil

Chemical	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	-	1.27E+04	-	-	-	-	5.40E-03	-	2.12E-04	5.61E-03
Antimony (metallic)	-	4.60E+00	-	-	-	-	4.88E-03	-	-	4.88E-03
Arsenic, Inorganic	-	9.30E+00	1.27E-06	2.69E-07	1.19E-09	1.54E-06	7.90E-03	1.67E-03	5.16E-05	9.62E-03
Barium	-	2.37E+02	-	-	-	-	5.03E-04	-	3.94E-05	5.42E-04
Benz[a]anthracene	4.41E+06	8.04E-01	1.22E-08	6.71E-09	4.44E-10	1.93E-08	-	-	-	-
Benzo[a]pyrene	-	7.66E-01	1.16E-07	6.39E-08	1.37E-11	1.80E-07	1.08E-03	5.97E-04	3.19E-05	1.71E-03
Benzo[b]fluoranthene	-	1.00E+00	1.52E-08	8.35E-09	1.79E-12	2.35E-08	-	-	-	-
Benzo[k]fluoranthene	-	5.31E-01	8.05E-10	4.43E-10	9.48E-14	1.25E-09	-	-	-	-
Cadmium (Diet)	-	3.85E+00	-	-	2.06E-10	2.06E-10	1.63E-03	2.77E-04	3.21E-05	1.94E-03
Chromium(III), Insoluble Salts	-	6.31E+01	-	-	-	-	1.79E-05	-	-	1.79E-05
Chrysene	-	8.26E-01	1.25E-10	6.89E-11	1.47E-14	1.94E-10	-	-	-	-
Cobalt	-	4.88E+00	-	-	1.31E-09	1.31E-09	6.91E-03	-	6.78E-05	6.98E-03
Copper	-	2.94E+02	-	-	-	-	3.12E-03	-	-	3.12E-03
Dibenz[a,h]anthracene	-	1.83E-01	2.78E-08	1.53E-08	3.27E-12	4.30E-08	-	-	-	-
Indeno[1,2,3-cd]pyrene	-	5.06E-01	7.67E-09	4.22E-09	9.03E-13	1.19E-08	-	-	-	-
Manganese (Non-diet)	-	1.31E+03	-	-	-	-	2.31E-02	-	2.18E-03	2.53E-02
Mercury (elemental)	3.47E+04	3.48E-01	-	-	-	-	-	-	3.78E-03	3.78E-03
Thallium Sulfate	-	1.85E+00	-	-	-	-	3.93E-02	-	-	3.93E-02
Zinc and Compounds	-	5.25E+02	-	-	-	-	7.44E-04	-	-	7.44E-04
<i>*Total Risk/HI</i>	-	-	<i>1.45E-06</i>	<i>3.68E-07</i>	<i>3.17E-09</i>	<i>1.82E-06</i>	<i>9.46E-02</i>	<i>2.54E-03</i>	<i>6.40E-03</i>	<i>1.04E-01</i>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{soil}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{veg}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-		1	-	1

## Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>1</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{10}$ (cm <sup>2</sup> /s)
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-		PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-		PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-		PAH	4.76E-02
-	-	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC	-
-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-

# Site-specific Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	1.87E+04	1.87E+04	2.35E+02	1.39E+03	1.20E+04	1.98E+02	1.98E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc
-	-	1.36E+09	-	-	-	-	-	7.06E+04	-	-	7.06E+04	7.06E+04 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-	4.50E+01
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05	-
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-	-	7.50E+01
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-	3.50E+01
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06	-
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04	-	-
Zinc and Compounds	-	-	-	-	3.00E-01	I	-	-	1	-	1	-	-	-	6.20E+01
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ib</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-	1.36E+09
Antimony (metallic)	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-	-	-	1.36E+09
Arsenic, Inorganic	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-	-	-	1.36E+09
Barium	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-	-	-	1.36E+09
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Cadmium (Diet)	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-	-	-	1.36E+09
Chromium(III), Insoluble Salts	-	-		-		-		INORGANIC	-	-	-	1.36E+09
Chrysene	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	-	1.36E+09
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-	1.36E+09
Copper	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-	-	-	1.36E+09
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02	5.21E-06	-	1.36E+09
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-		PAH	4.48E-02	5.23E-06	-	1.36E+09
Manganese (Non-diet)	-	-		2368.15	PHYSROP	4325	CRC89	INORGANIC	-	-	-	1.36E+09
Mercury (elemental)	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09
Thallium Sulfate	-	-		-		-		INORGANIC	-	-	-	1.36E+09
Zinc and Compounds	-	-		1181.15	PHYSROP	3170	YAWS	INORGANIC	-	-	-	1.36E+09
<i>*Total Risk/HL</i>	-	-		-		-			-	-	-	-



# Site-specific Outdoor Worker Risk for Soil

Chemical	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	-	9.31E+03	-	-	-	-	3.95E-03	-	1.55E-04	4.11E-03
Antimony (metallic)	-	8.65E+00	-	-	-	-	9.18E-03	-	-	9.18E-03
Arsenic, Inorganic	-	8.61E+00	1.18E-06	2.49E-07	1.10E-09	1.43E-06	7.31E-03	1.55E-03	4.78E-05	8.91E-03
Barium	-	3.19E+02	-	-	-	-	6.77E-04	-	5.31E-05	7.30E-04
Benz[a]anthracene	4.41E+06	8.40E-01	1.27E-08	7.01E-09	4.64E-10	2.02E-08	-	-	-	-
Benzo[a]pyrene	-	8.19E-01	1.24E-07	6.83E-08	1.46E-11	1.93E-07	1.16E-03	6.38E-04	3.41E-05	1.83E-03
Benzo[b]fluoranthene	-	9.86E-01	1.50E-08	8.23E-09	1.76E-12	2.32E-08	-	-	-	-
Benzo[k]fluoranthene	-	6.12E-01	9.28E-10	5.11E-10	1.09E-13	1.44E-09	-	-	-	-
Cadmium (Diet)	-	2.90E+00	-	-	1.55E-10	1.55E-10	1.23E-03	2.08E-04	2.42E-05	1.46E-03
Chromium(III), Insoluble Salts	-	3.53E+01	-	-	-	-	9.99E-06	-	-	9.99E-06
Chrysene	-	8.90E-01	1.35E-10	7.43E-11	1.59E-14	2.09E-10	-	-	-	-
Cobalt	-	1.24E+01	-	-	3.31E-09	3.31E-09	1.75E-02	-	1.72E-04	1.77E-02
Copper	-	3.51E+02	-	-	-	-	3.73E-03	-	-	3.73E-03
Dibenz[a,h]anthracene	-	2.12E-01	3.22E-08	1.77E-08	3.78E-12	4.98E-08	-	-	-	-
Indeno[1,2,3-cd]pyrene	-	5.11E-01	7.75E-09	4.26E-09	9.12E-13	1.20E-08	-	-	-	-
Manganese (Non-diet)	-	1.06E+03	-	-	-	-	1.87E-02	-	1.76E-03	2.04E-02
Mercury (elemental)	3.47E+04	4.45E-01	-	-	-	-	-	-	4.84E-03	4.84E-03
Thallium Sulfate	-	1.55E+00	-	-	-	-	3.29E-02	-	-	3.29E-02
Zinc and Compounds	-	1.09E+03	-	-	-	-	1.54E-03	-	-	1.54E-03
<i>*Total Risk/HI</i>	-	-	<i>1.37E-06</i>	<i>3.55E-07</i>	<i>5.06E-09</i>	<i>1.73E-06</i>	<i>9.79E-02</i>	<i>2.39E-03</i>	<i>7.08E-03</i>	<i>1.07E-01</i>

# Site-specific Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
A (PEF Dispersion Constant)	2.4538	2.4538
$A_{site}$ (areal extent of site) $m^2$	2023.43	2023.43
B (PEF Dispersion Constant)	17.5660	17.5660
C (PEF Dispersion Constant)	189.0426	189.0426
$F_n$ Unitless Dispersion Correction Factor	0.185837208	0.185837208
F(x) (function dependant on $U_{min}/U_0$ , derived using Cowherd et al. (1985))	0.194	0.194
$M_{moist}$ (Gravimetric soil moisture content) %	7.9	7.9
$M_{moist,av}$ (Gravimetric soil moisture content) %	12	12
$M_{wind}$ (dust emitted by wind erosion) g	51288.84717	51288.84717
$N_{dump}$ (number of times soil is dumped)	2	2
$N_{till}$ (number of times soil is tilled)	2	2
$Q/C_{ca}$ (inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source) g/m <sup>2</sup> -s per kg/m <sup>3</sup>	14.31407	14.31407
$\rho_{soil}$ (density) g/cm <sup>3</sup> - chemical-specific	1.68	1.68
$s_{soil}$ (soil silt content) %	6.9	6.9
$AF_{cw}$ (skin adherence factor - construction worker) mg/cm <sup>2</sup>	0.3	0.3
$AT_{cw}$ (averaging time - construction worker) days	365	365
$BW_{cw}$ (body weight - construction worker) kg	80	80
$ED_{cw}$ (exposure duration - construction worker) yr	1	1
$EF_{cw}$ (exposure frequency - construction worker) day/yr	250	250
$ET_{cw}$ (exposure time - construction worker) hr/day	8	8
THQ (target hazard quotient) unitless	0.1	0.1
$IRS_{cw}$ (soil ingestion rate - construction worker) mg/day	330	330
LT (lifetime) yr	70	70
$SA_{cw}$ (surface area - construction worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
$S_{doz}$ (dozing speed) kph	11.4	11.4
$S_{grade}$ (grading speed) kph	11.4	11.4
$s_{fill}$ (soil silt content) %	18	18
$t_c$ (overall duration of construction) hours	8400	8400

# Site-specific Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
$T_c$ (overall duration of construction) s	30240000	30240000
T (time over which traffic occurs) s	7200000	7200000
$T_t$ (overall duration of traffic) s	7200000	7200000
$U_m$ (mean annual wind speed) m/s	4.69	4.69
$U_t$ (equivalent threshold value) m/s	11.32	11.32
V (fraction of vegetative cover)	0	0

# Site-specific

## Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Aluminum	7429-90-5	No	No	Inorganics	-	-	-	-	1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-
Antimony (metallic)	7440-36-0	No	No	Inorganics	-	-	-	-	4.00E-04	P /Subchronic	-	-	0.15	-
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03
Barium	7440-39-3	No	No	Inorganics	-	-	-	-	2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I /Chronic	2.00E-06	I /Chronic	1	0.13
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-	-	1.80E-03	I	5.00E-04	A /Subchronic	1.00E-05	A /Chronic	0.025	0.001
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-	-	-	-	1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13
Cobalt	7440-48-4	No	No	Inorganics	-	-	9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-
Copper	7440-50-8	No	No	Inorganics	-	-	-	-	1.00E-02	A /Subchronic	-	-	1	-
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia}$ (cm <sup>2</sup> /s)
1	-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
1	-	-	-	4.50E+01	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-
0.6	-	-	-	2.90E+01	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-
1	-	-	-	4.10E+01	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-
1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02
1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02
1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02
1	-	-	-	7.50E+01	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-
1	-	-	-	1.80E+06	-	-		-	-	-		INORGANIC	-
1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
1	-	-	-	3.50E+01	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-
1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	1.36E+09	-	-	-	-	-	3.39E+04	-	2.85E+06	3.35E+04	3.35E+04 nc
-	-	1.36E+09	-	-	-	-	-	1.36E+01	-	-	1.36E+01	1.36E+01 nc
-	-	1.36E+09	-	2.75E+01	1.72E+02	9.69E+04	2.37E+01	1.70E+01	1.06E+02	8.56E+03	1.46E+01	1.46E+01 nc
-	-	1.36E+09	-	-	-	-	-	6.79E+03	-	2.85E+06	6.77E+03	6.77E+03 nc
6.75E-06	6.83E-10	1.36E+09	9.57E+05	2.48E+02	5.94E+02	4.89E+03	1.69E+02	-	-	-	-	1.69E+02 ca
5.56E-06	-	1.36E+09	-	2.48E+01	5.94E+01	6.95E+05	1.75E+01	1.02E+01	2.44E+01	1.14E+03	7.14E+00	7.14E+00 nc
5.56E-06	-	1.36E+09	-	2.48E+02	5.94E+02	6.95E+06	1.75E+02	-	-	-	-	1.75E+02 ca
5.56E-06	-	1.36E+09	-	2.48E+03	5.94E+03	6.95E+07	1.75E+03	-	-	-	-	1.75E+03 ca
-	-	1.36E+09	-	-	-	2.32E+05	2.32E+05	1.70E+01	1.32E+02	5.71E+03	1.50E+01	1.50E+01 nc
-	-	1.36E+09	-	-	-	-	-	5.09E+04	-	2.85E+06	5.00E+04	5.00E+04 nc
6.75E-06	-	1.36E+09	-	2.48E+04	5.94E+04	6.95E+08	1.75E+04	-	-	-	-	1.75E+04 ca
-	-	1.36E+09	-	-	-	4.63E+04	4.63E+04	1.02E+02	-	1.14E+04	1.01E+02	1.01E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.39E+02	-	-	3.39E+02	3.39E+02 nc
5.21E-06	-	1.36E+09	-	2.48E+01	5.94E+01	6.95E+05	1.75E+01	-	-	-	-	1.75E+01 ca

# Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

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Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S /Chronic	5.00E-05	I /Chronic	0.04	-
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	H /Subchronic	1	-
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		5.00E-05	X /Subchronic	-		1	-
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	A /Subchronic	-		1	-

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia}$ (cm <sup>2</sup> /s)
1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
1	-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
1	-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
1	-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-



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$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
5.23E-06	-	1.36E+09	-	2.48E+02	5.94E+02	6.95E+06	1.75E+02	-	-	-	-	1.75E+02 ca
-	-	1.36E+09	-	-	-	-	-	8.15E+02	-	2.85E+04	7.92E+02	7.92E+02 nc
6.30E-06	1.10E-05	1.36E+09	7.53E+03	-	-	-	-	-	-	9.49E-01	9.49E-01	9.49E-01 nc
-	-	1.36E+09	-	-	-	-	-	1.70E+00	-	-	1.70E+00	1.70E+00 nc
-	-	1.36E+09	-	-	-	-	-	1.02E+04	-	-	1.02E+04	1.02E+04 nc

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>0</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-	1	-	-	-
Antimony (metallic)	-	-	-	-	4.00E-04	P /Subchronic	-	-	0.15	-	1	-	-	-
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03	0.6	-	-	-
Barium	-	-	-	-	2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-	1	-	-	-
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I /Chronic	2.00E-06	I /Chronic	1	0.13	1	-	1.62E-03	5.87E+05
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05
Cadmium (Diet)	-	-	1.80E-03	I	5.00E-04	A /Subchronic	1.00E-05	A /Chronic	0.025	0.001	1	-	-	-
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-	1	-	-	-
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05
Cobalt	-	-	9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-	1	-	-	-
Copper	-	-	-	-	1.00E-02	A /Subchronic	-	-	1	-	1	-	-	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06
Manganese (Non-diet)	-	-	-	-	2.40E-02	S /Chronic	5.00E-05	I /Chronic	0.04	-	1	-	-	-
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	H /Subchronic	1	-	1	3.13E+00	6.00E-02	-
Thallium Sulfate	-	-	-	-	5.00E-05	X /Subchronic	-	-	1	-	1	-	5.47E+04	-
Zinc and Compounds	-	-	-	-	3.00E-01	A /Subchronic	-	-	1	-	1	-	-	-
<i>*Total Risk/HL</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	$K_o \backslash$ ( $\text{cm}^3/\text{g}$ )	HLC ( $\text{atm}\cdot\text{m}^3/\text{mole}$ )	Henry's Law Constant Used in Calcs (unitless)	H` and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia} \backslash$ ( $\text{cm}^2/\text{s}$ )	$D_{iw} \backslash$ ( $\text{cm}^2/\text{s}$ )	$D_A \backslash$ ( $\text{cm}^2/\text{s}$ )
Aluminum	1.50E+03	-	-	-	2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-
Antimony (metallic)	4.50E+01	-	-	-	1908.15	PHYSROP	5070	YAWS	INORGANIC	-	-	-
Arsenic, Inorganic	2.90E+01	-	-	-	888.15	PHYSROP	1673	CRC89	INORGANIC	-	-	-
Barium	4.10E+01	-	-	-	1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-	-	-
Benz[a]anthracene	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10
Benzo[a]pyrene	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[b]fluoranthene	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[k]fluoranthene	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-	-	PAH	4.76E-02	5.56E-06	-
Cadmium (Diet)	7.50E+01	-	-	-	1038.15	PHYSROP	2291	YAWS	INORGANIC	-	-	-
Chromium(III), Insoluble Salts	1.80E+06	-	-	-	-	-	-	-	INORGANIC	-	-	-
Chrysene	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	-
Cobalt	4.50E+01	-	-	-	3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-
Copper	3.50E+01	-	-	-	2868.15	PHYSROP	5123	YAWS	INORGANIC	-	-	-
Dibenz[a,h]anthracene	-	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-	-	PAH	4.46E-02	5.21E-06	-
Indeno[1,2,3-cd]pyrene	-	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-	-	PAH	4.48E-02	5.23E-06	-
Manganese (Non-diet)	6.50E+01	-	-	-	2368.15	PHYSROP	4325	CRC89	INORGANIC	-	-	-
Mercury (elemental)	5.20E+01	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05
Thallium Sulfate	-	-	-	-	-	-	-	-	INORGANIC	-	-	-
Zinc and Compounds	6.20E+01	-	-	-	1181.15	PHYSROP	3170	YAWS	INORGANIC	-	-	-
<i>*Total Risk/HL</i>	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Particulate Emission Factor (m³/kg)	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	1.36E+09	-	9.31E+03	-	-	-	-	2.74E-02	-	3.26E-04	2.78E-02
Antimony (metallic)	1.36E+09	-	8.65E+00	-	-	-	-	6.37E-02	-	-	6.37E-02
Arsenic, Inorganic	1.36E+09	-	8.61E+00	3.13E-07	5.01E-08	8.88E-11	3.63E-07	5.07E-02	8.13E-03	1.01E-04	5.90E-02
Barium	1.36E+09	-	3.19E+02	-	-	-	-	4.70E-03	-	1.12E-05	4.71E-03
Benz[a]anthracene	1.36E+09	9.57E+05	8.40E-01	3.39E-09	1.41E-09	1.72E-10	4.98E-09	-	-	-	-
Benzo[a]pyrene	1.36E+09	-	8.19E-01	3.31E-08	1.38E-08	1.18E-12	4.68E-08	8.04E-03	3.35E-03	7.17E-05	1.15E-02
Benzo[b]fluoranthene	1.36E+09	-	9.86E-01	3.98E-09	1.66E-09	1.42E-13	5.64E-09	-	-	-	-
Benzo[k]fluoranthene	1.36E+09	-	6.12E-01	2.47E-10	1.03E-10	8.81E-15	3.50E-10	-	-	-	-
Cadmium (Diet)	1.36E+09	-	2.90E+00	-	-	1.25E-11	1.25E-11	1.71E-02	2.19E-03	5.08E-05	1.93E-02
Chromium(III), Insoluble Salts	1.36E+09	-	3.53E+01	-	-	-	-	6.93E-05	-	1.24E-06	7.05E-05
Chrysene	1.36E+09	-	8.90E-01	3.59E-11	1.50E-11	1.28E-15	5.09E-11	-	-	-	-
Cobalt	1.36E+09	-	1.24E+01	-	-	2.67E-10	2.67E-10	1.22E-02	-	1.08E-04	1.23E-02
Copper	1.36E+09	-	3.51E+02	-	-	-	-	1.03E-01	-	-	1.03E-01
Dibenz[a,h]anthracene	1.36E+09	-	2.12E-01	8.56E-09	3.57E-09	3.05E-13	1.21E-08	-	-	-	-
Indeno[1,2,3-cd]pyrene	1.36E+09	-	5.11E-01	2.06E-09	8.60E-10	7.36E-14	2.92E-09	-	-	-	-
Manganese (Non-diet)	1.36E+09	-	1.06E+03	-	-	-	-	1.30E-01	-	3.70E-03	1.33E-01
Mercury (elemental)	1.36E+09	7.53E+03	4.45E-01	-	-	-	-	-	-	4.69E-02	4.69E-02
Thallium Sulfate	1.36E+09	-	1.55E+00	-	-	-	-	9.13E-02	-	-	9.13E-02
Zinc and Compounds	1.36E+09	-	1.09E+03	-	-	-	-	1.07E-02	-	-	1.07E-02
<i>*Total Risk/HI</i>	-	-	-	<i>3.64E-07</i>	<i>7.15E-08</i>	<i>5.42E-10</i>	<i>4.36E-07</i>	<i>5.19E-01</i>	<i>1.37E-02</i>	<i>5.13E-02</i>	<i>5.84E-01</i>

	A	B	C	D	E	F	G	H	I	J	K	L
1	<b>UCL Statistics for Data Sets with Non-Detects</b>											
2												
3	User Selected Options											
4	Date/Time of Computation		ProUCL 5.11/17/2020 4:18:13 PM									
5	From File		AreaC_WB_SS_prouclin.xls									
6	Full Precision		OFF									
7	Confidence Coefficient		95%									
8	Number of Bootstrap Operations		2000									
9												
10												
11	<b>Aluminum</b>											
12												
13	<b>General Statistics</b>											
14	Total Number of Observations				25		Number of Distinct Observations				24	
15							Number of Missing Observations				0	
16	Minimum				1380		Mean				10548	
17	Maximum				22900		Median				8650	
18	SD				6302		Std. Error of Mean				1260	
19	Coefficient of Variation				0.597		Skewness				0.529	
20												
21	<b>Normal GOF Test</b>											
22	Shapiro Wilk Test Statistic				0.937		<b>Shapiro Wilk GOF Test</b>					
23	5% Shapiro Wilk Critical Value				0.918		Data appear Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.169		<b>Lilliefors GOF Test</b>					
25	5% Lilliefors Critical Value				0.173		Data appear Normal at 5% Significance Level					
26	<b>Data appear Normal at 5% Significance Level</b>											
27												
28	<b>Assuming Normal Distribution</b>											
29	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
30	95% Student's-t UCL				12705		95% Adjusted-CLT UCL (Chen-1995)				12764	
31							95% Modified-t UCL (Johnson-1978)				12727	
32												
33	<b>Gamma GOF Test</b>											
34	A-D Test Statistic				0.229		<b>Anderson-Darling Gamma GOF Test</b>					
35	5% A-D Critical Value				0.754		Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.101		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
37	5% K-S Critical Value				0.176		Detected data appear Gamma Distributed at 5% Significance Level					
38	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
39												
40	<b>Gamma Statistics</b>											
41	k hat (MLE)				2.548		k star (bias corrected MLE)				2.268	
42	Theta hat (MLE)				4141		Theta star (bias corrected MLE)				4650	
43	nu hat (MLE)				127.4		nu star (bias corrected)				113.4	
44	MLE Mean (bias corrected)				10548		MLE Sd (bias corrected)				7004	
45							Approximate Chi Square Value (0.05)				89.84	
46	Adjusted Level of Significance				0.0395		Adjusted Chi Square Value				88.41	
47												
48	<b>Assuming Gamma Distribution</b>											
49	95% Approximate Gamma UCL (use when n>=50))				13318		95% Adjusted Gamma UCL (use when n<50)				13533	
50												
51	<b>Lognormal GOF Test</b>											
52	Shapiro Wilk Test Statistic				0.951		<b>Shapiro Wilk Lognormal GOF Test</b>					
53	5% Shapiro Wilk Critical Value				0.918		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
54	Lilliefors Test Statistic					0.113	Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value					0.173	Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data					7.23	Mean of logged Data					9.055
60	Maximum of Logged Data					10.04	SD of logged Data					0.715
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL					15153	90% Chebyshev (MVUE) UCL					15968
64	95% Chebyshev (MVUE) UCL					18257	97.5% Chebyshev (MVUE) UCL					21433
65	99% Chebyshev (MVUE) UCL					27671						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL					12622	95% Jackknife UCL					12705
72	95% Standard Bootstrap UCL					12587	95% Bootstrap-t UCL					12872
73	95% Hall's Bootstrap UCL					12784	95% Percentile Bootstrap UCL					12537
74	95% BCA Bootstrap UCL					12738						
75	90% Chebyshev(Mean, Sd) UCL					14330	95% Chebyshev(Mean, Sd) UCL					16042
76	97.5% Chebyshev(Mean, Sd) UCL					18420	99% Chebyshev(Mean, Sd) UCL					23089
77												
78	Suggested UCL to Use											
79	95% Student's-t UCL					12705						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												
86	Antimony											
87												
88	General Statistics											
89	Total Number of Observations					17	Number of Distinct Observations					13
90	Number of Detects					6	Number of Non-Detects					11
91	Number of Distinct Detects					6	Number of Distinct Non-Detects					7
92	Minimum Detect					0.9	Minimum Non-Detect					6
93	Maximum Detect					11.9	Maximum Non-Detect					8.1
94	Variance Detects					18.46	Percent Non-Detects					64.71%
95	Mean Detects					4.017	SD Detects					4.296
96	Median Detects					2	CV Detects					1.07
97	Skewness Detects					1.626	Kurtosis Detects					2.117
98	Mean of Logged Detects					0.958	SD of Logged Detects					0.991
99												
100	Normal GOF Test on Detects Only											
101	Shapiro Wilk Test Statistic					0.777	Shapiro Wilk GOF Test					
102	5% Shapiro Wilk Critical Value					0.788	Detected Data Not Normal at 5% Significance Level					
103	Lilliefors Test Statistic					0.339	Lilliefors GOF Test					
104	5% Lilliefors Critical Value					0.325	Detected Data Not Normal at 5% Significance Level					
105	Detected Data Not Normal at 5% Significance Level											
106												

	A	B	C	D	E	F	G	H	I	J	K	L	
107	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
108	KM Mean				2.614	KM Standard Error of Mean				0.822			
109	KM SD				2.745	95% KM (BCA) UCL				4.229			
110	95% KM (t) UCL				4.049	95% KM (Percentile Bootstrap) UCL				4.032			
111	95% KM (z) UCL				3.966	95% KM Bootstrap t UCL				6.841			
112	90% KM Chebyshev UCL				5.079	95% KM Chebyshev UCL				6.196			
113	97.5% KM Chebyshev UCL				7.746	99% KM Chebyshev UCL				10.79			
114													
115	<b>Gamma GOF Tests on Detected Observations Only</b>												
116	A-D Test Statistic				0.455	<b>Anderson-Darling GOF Test</b>							
117	5% A-D Critical Value				0.711	Detected data appear Gamma Distributed at 5% Significance Level							
118	K-S Test Statistic				0.307	<b>Kolmogorov-Smirnov GOF</b>							
119	5% K-S Critical Value				0.339	Detected data appear Gamma Distributed at 5% Significance Level							
120	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
121													
122	<b>Gamma Statistics on Detected Data Only</b>												
123	k hat (MLE)				1.296	k star (bias corrected MLE)				0.759			
124	Theta hat (MLE)				3.098	Theta star (bias corrected MLE)				5.29			
125	nu hat (MLE)				15.56	nu star (bias corrected)				9.112			
126	Mean (detects)				4.017								
127													
128	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
129	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
130	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
131	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
132	This is especially true when the sample size is small.												
133	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
134	Minimum				0.01	Mean				2.503			
135	Maximum				11.9	Median				1.717			
136	SD				2.763	CV				1.104			
137	k hat (MLE)				1.06	k star (bias corrected MLE)				0.912			
138	Theta hat (MLE)				2.362	Theta star (bias corrected MLE)				2.745			
139	nu hat (MLE)				36.03	nu star (bias corrected)				31			
140	Adjusted Level of Significance ( $\beta$ )				0.0346								
141	Approximate Chi Square Value (31.00, $\alpha$ )				19.28	Adjusted Chi Square Value (31.00, $\beta$ )				18.32			
142	95% Gamma Approximate UCL (use when $n \geq 50$ )				4.025	95% Gamma Adjusted UCL (use when $n < 50$ )				4.237			
143													
144	<b>Estimates of Gamma Parameters using KM Estimates</b>												
145	Mean (KM)				2.614	SD (KM)				2.745			
146	Variance (KM)				7.538	SE of Mean (KM)				0.822			
147	k hat (KM)				0.906	k star (KM)				0.786			
148	nu hat (KM)				30.82	nu star (KM)				26.71			
149	theta hat (KM)				2.884	theta star (KM)				3.327			
150	80% gamma percentile (KM)				4.275	90% gamma percentile (KM)				6.383			
151	95% gamma percentile (KM)				8.534	99% gamma percentile (KM)				13.62			
152													
153	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
154	Approximate Chi Square Value (26.71, $\alpha$ )				15.93	Adjusted Chi Square Value (26.71, $\beta$ )				15.06			
155	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				4.383	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				4.636			
156													
157	<b>Lognormal GOF Test on Detected Observations Only</b>												
158	Shapiro Wilk Test Statistic				0.92	<b>Shapiro Wilk GOF Test</b>							
159	5% Shapiro Wilk Critical Value				0.788	Detected Data appear Lognormal at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L
160	Lilliefors Test Statistic					0.253	Lilliefors GOF Test					
161	5% Lilliefors Critical Value					0.325	Detected Data appear Lognormal at 5% Significance Level					
162	Detected Data appear Lognormal at 5% Significance Level											
163												
164	Lognormal ROS Statistics Using Imputed Non-Detects											
165	Mean in Original Scale					2.543	Mean in Log Scale					0.662
166	SD in Original Scale					2.689	SD in Log Scale					0.661
167	95% t UCL (assumes normality of ROS data)					3.681	95% Percentile Bootstrap UCL					3.678
168	95% BCA Bootstrap UCL					4.294	95% Bootstrap t UCL					7.065
169	95% H-UCL (Log ROS)					3.472						
170												
171	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
172	KM Mean (logged)					0.64	KM Geo Mean					1.897
173	KM SD (logged)					0.709	95% Critical H Value (KM-Log)					2.268
174	KM Standard Error of Mean (logged)					0.253	95% H-UCL (KM -Log)					3.648
175	KM SD (logged)					0.709	95% Critical H Value (KM-Log)					2.268
176	KM Standard Error of Mean (logged)					0.253						
177												
178	DL/2 Statistics											
179	DL/2 Normal						DL/2 Log-Transformed					
180	Mean in Original Scale					3.588	Mean in Log Scale					1.117
181	SD in Original Scale					2.442	SD in Log Scale					0.574
182	95% t UCL (Assumes normality)					4.622	95% H-Stat UCL					4.879
183	DL/2 is not a recommended method, provided for comparisons and historical reasons											
184												
185	Nonparametric Distribution Free UCL Statistics											
186	Detected Data appear Gamma Distributed at 5% Significance Level											
187												
188	Suggested UCL to Use											
189	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					4.636						
190												
191	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
192	Recommendations are based upon data size, data distribution, and skewness.											
193	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
194	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
195												
196												
197	Arsenic											
198												
199	General Statistics											
200	Total Number of Observations					24	Number of Distinct Observations					20
201							Number of Missing Observations					0
202	Minimum					1.8	Mean					7.054
203	Maximum					31.6	Median					5.9
204	SD					6.177	Std. Error of Mean					1.261
205	Coefficient of Variation					0.876	Skewness					2.933
206												
207	Normal GOF Test											
208	Shapiro Wilk Test Statistic					0.697	Shapiro Wilk GOF Test					
209	5% Shapiro Wilk Critical Value					0.916	Data Not Normal at 5% Significance Level					
210	Lilliefors Test Statistic					0.202	Lilliefors GOF Test					
211	5% Lilliefors Critical Value					0.177	Data Not Normal at 5% Significance Level					
212	Data Not Normal at 5% Significance Level											



	A	B	C	D	E	F	G	H	I	J	K	L	
213													
214	<b>Assuming Normal Distribution</b>												
215	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
216	95% Student's-t UCL					9.215		95% Adjusted-CLT UCL (Chen-1995)					9.935
217								95% Modified-t UCL (Johnson-1978)					9.341
218													
219	<b>Gamma GOF Test</b>												
220	A-D Test Statistic				0.469		<b>Anderson-Darling Gamma GOF Test</b>						
221	5% A-D Critical Value				0.754		Detected data appear Gamma Distributed at 5% Significance Level						
222	K-S Test Statistic				0.103		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
223	5% K-S Critical Value				0.18		Detected data appear Gamma Distributed at 5% Significance Level						
224	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
225													
226	<b>Gamma Statistics</b>												
227	k hat (MLE)				2.164		k star (bias corrected MLE)				1.921		
228	Theta hat (MLE)				3.26		Theta star (bias corrected MLE)				3.672		
229	nu hat (MLE)				103.9		nu star (bias corrected)				92.22		
230	MLE Mean (bias corrected)				7.054		MLE Sd (bias corrected)				5.089		
231							Approximate Chi Square Value (0.05)				71.07		
232	Adjusted Level of Significance				0.0392		Adjusted Chi Square Value				69.77		
233													
234	<b>Assuming Gamma Distribution</b>												
235	95% Approximate Gamma UCL (use when n>=50)				9.153		95% Adjusted Gamma UCL (use when n<50)				9.324		
236													
237	<b>Lognormal GOF Test</b>												
238	Shapiro Wilk Test Statistic				0.964		<b>Shapiro Wilk Lognormal GOF Test</b>						
239	5% Shapiro Wilk Critical Value				0.916		Data appear Lognormal at 5% Significance Level						
240	Lilliefors Test Statistic				0.11		<b>Lilliefors Lognormal GOF Test</b>						
241	5% Lilliefors Critical Value				0.177		Data appear Lognormal at 5% Significance Level						
242	<b>Data appear Lognormal at 5% Significance Level</b>												
243													
244	<b>Lognormal Statistics</b>												
245	Minimum of Logged Data				0.588		Mean of logged Data				1.705		
246	Maximum of Logged Data				3.453		SD of logged Data				0.692		
247													
248	<b>Assuming Lognormal Distribution</b>												
249	95% H-UCL				9.565		90% Chebyshev (MVUE) UCL				10.05		
250	95% Chebyshev (MVUE) UCL				11.48		97.5% Chebyshev (MVUE) UCL				13.45		
251	99% Chebyshev (MVUE) UCL				17.33								
252													
253	<b>Nonparametric Distribution Free UCL Statistics</b>												
254	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
255													
256	<b>Nonparametric Distribution Free UCLs</b>												
257	95% CLT UCL				9.128		95% Jackknife UCL				9.215		
258	95% Standard Bootstrap UCL				9.072		95% Bootstrap-t UCL				10.59		
259	95% Hall's Bootstrap UCL				18.63		95% Percentile Bootstrap UCL				9.313		
260	95% BCA Bootstrap UCL				9.875								
261	90% Chebyshev(Mean, Sd) UCL				10.84		95% Chebyshev(Mean, Sd) UCL				12.55		
262	97.5% Chebyshev(Mean, Sd) UCL				14.93		99% Chebyshev(Mean, Sd) UCL				19.6		
263													
264	<b>Suggested UCL to Use</b>												
265	95% Adjusted Gamma UCL				9.324								

	A	B	C	D	E	F	G	H	I	J	K	L
266												
267	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
268	Recommendations are based upon data size, data distribution, and skewness.											
269	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
270	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
271												
272												
273	<b>Barium</b>											
274												
275	<b>General Statistics</b>											
276	Total Number of Observations				25		Number of Distinct Observations				24	
277							Number of Missing Observations				0	
278	Minimum				13.1		Mean				163.7	
279	Maximum				816		Median				117	
280	SD				169.8		Std. Error of Mean				33.95	
281	Coefficient of Variation				1.037		Skewness				2.592	
282												
283	<b>Normal GOF Test</b>											
284	Shapiro Wilk Test Statistic				0.74		<b>Shapiro Wilk GOF Test</b>					
285	5% Shapiro Wilk Critical Value				0.918		Data Not Normal at 5% Significance Level					
286	Lilliefors Test Statistic				0.219		<b>Lilliefors GOF Test</b>					
287	5% Lilliefors Critical Value				0.173		Data Not Normal at 5% Significance Level					
288	<b>Data Not Normal at 5% Significance Level</b>											
289												
290	<b>Assuming Normal Distribution</b>											
291	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
292	95% Student's-t UCL				221.8		95% Adjusted-CLT UCL (Chen-1995)				238.3	
293							95% Modified-t UCL (Johnson-1978)				224.7	
294												
295	<b>Gamma GOF Test</b>											
296	A-D Test Statistic				0.356		<b>Anderson-Darling Gamma GOF Test</b>					
297	5% A-D Critical Value				0.768		Detected data appear Gamma Distributed at 5% Significance Level					
298	K-S Test Statistic				0.108		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
299	5% K-S Critical Value				0.179		Detected data appear Gamma Distributed at 5% Significance Level					
300	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
301												
302	<b>Gamma Statistics</b>											
303	k hat (MLE)				1.22		k star (bias corrected MLE)				1.101	
304	Theta hat (MLE)				134.1		Theta star (bias corrected MLE)				148.7	
305	nu hat (MLE)				61.02		nu star (bias corrected)				55.03	
306	MLE Mean (bias corrected)				163.7		MLE Sd (bias corrected)				156	
307							Approximate Chi Square Value (0.05)				38.98	
308	Adjusted Level of Significance				0.0395		Adjusted Chi Square Value				38.06	
309												
310	<b>Assuming Gamma Distribution</b>											
311	95% Approximate Gamma UCL (use when n>=50)				231.1		95% Adjusted Gamma UCL (use when n<50)				236.7	
312												
313	<b>Lognormal GOF Test</b>											
314	Shapiro Wilk Test Statistic				0.952		<b>Shapiro Wilk Lognormal GOF Test</b>					
315	5% Shapiro Wilk Critical Value				0.918		Data appear Lognormal at 5% Significance Level					
316	Lilliefors Test Statistic				0.129		<b>Lilliefors Lognormal GOF Test</b>					
317	5% Lilliefors Critical Value				0.173		Data appear Lognormal at 5% Significance Level					
318	<b>Data appear Lognormal at 5% Significance Level</b>											

	A	B	C	D	E	F	G	H	I	J	K	L		
319														
320	<b>Lognormal Statistics</b>													
321	Minimum of Logged Data				2.573		Mean of logged Data				4.635			
322	Maximum of Logged Data				6.704		SD of logged Data				1.052			
323														
324	<b>Assuming Lognormal Distribution</b>													
325	95% H-UCL				310.9		90% Chebyshev (MVUE) UCL				299.3			
326	95% Chebyshev (MVUE) UCL				356.3		97.5% Chebyshev (MVUE) UCL				435.3			
327	99% Chebyshev (MVUE) UCL				590.6									
328														
329	<b>Nonparametric Distribution Free UCL Statistics</b>													
330	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>													
331														
332	<b>Nonparametric Distribution Free UCLs</b>													
333	95% CLT UCL				219.5		95% Jackknife UCL				221.8			
334	95% Standard Bootstrap UCL				220.2		95% Bootstrap-t UCL				258.2			
335	95% Hall's Bootstrap UCL				493.6		95% Percentile Bootstrap UCL				222.1			
336	95% BCA Bootstrap UCL				239									
337	90% Chebyshev (Mean, Sd) UCL				265.5		95% Chebyshev (Mean, Sd) UCL				311.7			
338	97.5% Chebyshev (Mean, Sd) UCL				375.7		99% Chebyshev (Mean, Sd) UCL				501.5			
339														
340	<b>Suggested UCL to Use</b>													
341	95% Adjusted Gamma UCL				236.7									
342														
343	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.													
344	Recommendations are based upon data size, data distribution, and skewness.													
345	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).													
346	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.													
347														
348														
349	<b>Cadmium</b>													
350														
351	<b>General Statistics</b>													
352	Total Number of Observations				20		Number of Distinct Observations				20			
353									Number of Missing Observations				0	
354	Minimum				0.16		Mean				2.216			
355	Maximum				21.1		Median				0.955			
356	SD				4.538		Std. Error of Mean				1.015			
357	Coefficient of Variation				2.048		Skewness				4.179			
358														
359	<b>Normal GOF Test</b>													
360	Shapiro Wilk Test Statistic				0.409		<b>Shapiro Wilk GOF Test</b>							
361	5% Shapiro Wilk Critical Value				0.905		Data Not Normal at 5% Significance Level							
362	Lilliefors Test Statistic				0.366		<b>Lilliefors GOF Test</b>							
363	5% Lilliefors Critical Value				0.192		Data Not Normal at 5% Significance Level							
364	<b>Data Not Normal at 5% Significance Level</b>													
365														
366	<b>Assuming Normal Distribution</b>													
367	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>							
368	95% Student's-t UCL				3.97		95% Adjusted-CLT UCL (Chen-1995)				4.898			
369									95% Modified-t UCL (Johnson-1978)				4.128	
370														
371	<b>Gamma GOF Test</b>													

	A	B	C	D	E	F	G	H	I	J	K	L
372	A-D Test Statistic					1.184	<b>Anderson-Darling Gamma GOF Test</b>					
373	5% A-D Critical Value					0.779	Data Not Gamma Distributed at 5% Significance Level					
374	K-S Test Statistic					0.199	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
375	5% K-S Critical Value					0.201	Detected data appear Gamma Distributed at 5% Significance Level					
376	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
377												
378	<b>Gamma Statistics</b>											
379	k hat (MLE)					0.76	k star (bias corrected MLE)					0.679
380	Theta hat (MLE)					2.915	Theta star (bias corrected MLE)					3.261
381	nu hat (MLE)					30.41	nu star (bias corrected)					27.18
382	MLE Mean (bias corrected)					2.216	MLE Sd (bias corrected)					2.688
383							Approximate Chi Square Value (0.05)					16.29
384	Adjusted Level of Significance					0.038	Adjusted Chi Square Value					15.62
385												
386	<b>Assuming Gamma Distribution</b>											
387	95% Approximate Gamma UCL (use when n>=50)					3.696	95% Adjusted Gamma UCL (use when n<50)					3.854
388												
389	<b>Lognormal GOF Test</b>											
390	Shapiro Wilk Test Statistic					0.944	<b>Shapiro Wilk Lognormal GOF Test</b>					
391	5% Shapiro Wilk Critical Value					0.905	Data appear Lognormal at 5% Significance Level					
392	Lilliefors Test Statistic					0.131	<b>Lilliefors Lognormal GOF Test</b>					
393	5% Lilliefors Critical Value					0.192	Data appear Lognormal at 5% Significance Level					
394	<b>Data appear Lognormal at 5% Significance Level</b>											
395												
396	<b>Lognormal Statistics</b>											
397	Minimum of Logged Data					-1.833	Mean of logged Data					0.00938
398	Maximum of Logged Data					3.049	SD of logged Data					1.162
399												
400	<b>Assuming Lognormal Distribution</b>											
401	95% H-UCL					4.272	90% Chebyshev (MVUE) UCL					3.566
402	95% Chebyshev (MVUE) UCL					4.328	97.5% Chebyshev (MVUE) UCL					5.386
403	99% Chebyshev (MVUE) UCL					7.465						
404												
405	<b>Nonparametric Distribution Free UCL Statistics</b>											
406	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
407												
408	<b>Nonparametric Distribution Free UCLs</b>											
409	95% CLT UCL					3.885	95% Jackknife UCL					3.97
410	95% Standard Bootstrap UCL					3.879	95% Bootstrap-t UCL					9.018
411	95% Hall's Bootstrap UCL					10.22	95% Percentile Bootstrap UCL					4.131
412	95% BCA Bootstrap UCL					5.102						
413	90% Chebyshev(Mean, Sd) UCL					5.26	95% Chebyshev(Mean, Sd) UCL					6.639
414	97.5% Chebyshev(Mean, Sd) UCL					8.553	99% Chebyshev(Mean, Sd) UCL					12.31
415												
416	<b>Suggested UCL to Use</b>											
417	95% Adjusted Gamma UCL					3.854						
418												
419	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
420	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
421												
422	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
423	Recommendations are based upon data size, data distribution, and skewness.											
424	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											

	A	B	C	D	E	F	G	H	I	J	K	L	
425	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
426													
427													
428	<b>Chromium</b>												
429													
430	<b>General Statistics</b>												
431	Total Number of Observations				25		Number of Distinct Observations				24		
432									Number of Missing Observations				0
433	Minimum				3.4		Mean				46.5		
434	Maximum				600		Median				14.4		
435	SD				116.9		Std. Error of Mean				23.38		
436	Coefficient of Variation				2.514		Skewness				4.788		
437													
438	<b>Normal GOF Test</b>												
439	Shapiro Wilk Test Statistic				0.333		<b>Shapiro Wilk GOF Test</b>						
440	5% Shapiro Wilk Critical Value				0.918		Data Not Normal at 5% Significance Level						
441	Lilliefors Test Statistic				0.397		<b>Lilliefors GOF Test</b>						
442	5% Lilliefors Critical Value				0.173		Data Not Normal at 5% Significance Level						
443	<b>Data Not Normal at 5% Significance Level</b>												
444													
445	<b>Assuming Normal Distribution</b>												
446	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
447	95% Student's-t UCL				86.49		95% Adjusted-CLT UCL (Chen-1995)				108.9		
448									95% Modified-t UCL (Johnson-1978)				90.23
449													
450	<b>Gamma GOF Test</b>												
451	A-D Test Statistic				2.194		<b>Anderson-Darling Gamma GOF Test</b>						
452	5% A-D Critical Value				0.789		Data Not Gamma Distributed at 5% Significance Level						
453	K-S Test Statistic				0.205		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
454	5% K-S Critical Value				0.182		Data Not Gamma Distributed at 5% Significance Level						
455	<b>Data Not Gamma Distributed at 5% Significance Level</b>												
456													
457	<b>Gamma Statistics</b>												
458	k hat (MLE)				0.694		k star (bias corrected MLE)				0.638		
459	Theta hat (MLE)				66.96		Theta star (bias corrected MLE)				72.91		
460	nu hat (MLE)				34.72		nu star (bias corrected)				31.88		
461	MLE Mean (bias corrected)				46.5		MLE Sd (bias corrected)				58.23		
462									Approximate Chi Square Value (0.05)				19.98
463	Adjusted Level of Significance				0.0395						Adjusted Chi Square Value		19.34
464													
465	<b>Assuming Gamma Distribution</b>												
466	95% Approximate Gamma UCL (use when n>=50))				74.2		95% Adjusted Gamma UCL (use when n<50)				76.66		
467													
468	<b>Lognormal GOF Test</b>												
469	Shapiro Wilk Test Statistic				0.922		<b>Shapiro Wilk Lognormal GOF Test</b>						
470	5% Shapiro Wilk Critical Value				0.918		Data appear Lognormal at 5% Significance Level						
471	Lilliefors Test Statistic				0.129		<b>Lilliefors Lognormal GOF Test</b>						
472	5% Lilliefors Critical Value				0.173		Data appear Lognormal at 5% Significance Level						
473	<b>Data appear Lognormal at 5% Significance Level</b>												
474													
475	<b>Lognormal Statistics</b>												
476	Minimum of Logged Data				1.224		Mean of logged Data				2.968		
477	Maximum of Logged Data				6.397		SD of logged Data				1.091		

	A	B	C	D	E	F	G	H	I	J	K	L	
478													
479	<b>Assuming Lognormal Distribution</b>												
480	95% H-UCL				63.12					90% Chebyshev (MVUE) UCL			59.78
481	95% Chebyshev (MVUE) UCL				71.44					97.5% Chebyshev (MVUE) UCL			87.62
482	99% Chebyshev (MVUE) UCL				119.4								
483													
484	<b>Nonparametric Distribution Free UCL Statistics</b>												
485	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
486													
487	<b>Nonparametric Distribution Free UCLs</b>												
488	95% CLT UCL				84.95					95% Jackknife UCL			86.49
489	95% Standard Bootstrap UCL				84.19					95% Bootstrap-t UCL			244.9
490	95% Hall's Bootstrap UCL				223					95% Percentile Bootstrap UCL			92.45
491	95% BCA Bootstrap UCL				121.3								
492	90% Chebyshev(Mean, Sd) UCL				116.6					95% Chebyshev(Mean, Sd) UCL			148.4
493	97.5% Chebyshev(Mean, Sd) UCL				192.5					99% Chebyshev(Mean, Sd) UCL			279.1
494													
495	<b>Suggested UCL to Use</b>												
496	95% H-UCL				63.12								
497													
498	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
499	Recommendations are based upon data size, data distribution, and skewness.												
500	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
501	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
502													
503	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>												
504	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>												
505	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>												
506	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>												
507													
508													
509	<b>Cobalt</b>												
510													
511	<b>General Statistics</b>												
512	Total Number of Observations				18					Number of Distinct Observations			16
513										Number of Missing Observations			0
514	Minimum				1.9					Mean			4.267
515	Maximum				6.8					Median			4.15
516	SD				1.507					Std. Error of Mean			0.355
517	Coefficient of Variation				0.353					Skewness			0.0657
518													
519	<b>Normal GOF Test</b>												
520	Shapiro Wilk Test Statistic				0.961					<b>Shapiro Wilk GOF Test</b>			
521	5% Shapiro Wilk Critical Value				0.897					Data appear Normal at 5% Significance Level			
522	Lilliefors Test Statistic				0.102					<b>Lilliefors GOF Test</b>			
523	5% Lilliefors Critical Value				0.202					Data appear Normal at 5% Significance Level			
524	<b>Data appear Normal at 5% Significance Level</b>												
525													
526	<b>Assuming Normal Distribution</b>												
527	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
528	95% Student's-t UCL				4.885					95% Adjusted-CLT UCL (Chen-1995)			4.857
529										95% Modified-t UCL (Johnson-1978)			4.886
530													

	A	B	C	D	E	F	G	H	I	J	K	L	
531	<b>Gamma GOF Test</b>												
532	A-D Test Statistic				0.303	<b>Anderson-Darling Gamma GOF Test</b>							
533	5% A-D Critical Value				0.741	Detected data appear Gamma Distributed at 5% Significance Level							
534	K-S Test Statistic				0.125	<b>Kolmogorov-Smirnov Gamma GOF Test</b>							
535	5% K-S Critical Value				0.204	Detected data appear Gamma Distributed at 5% Significance Level							
536	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
537													
538	<b>Gamma Statistics</b>												
539	k hat (MLE)				7.745	k star (bias corrected MLE)				6.491			
540	Theta hat (MLE)				0.551	Theta star (bias corrected MLE)				0.657			
541	nu hat (MLE)				278.8	nu star (bias corrected)				233.7			
542	MLE Mean (bias corrected)				4.267	MLE Sd (bias corrected)				1.675			
543						Approximate Chi Square Value (0.05)				199.3			
544	Adjusted Level of Significance				0.0357	Adjusted Chi Square Value				196.2			
545													
546	<b>Assuming Gamma Distribution</b>												
547	95% Approximate Gamma UCL (use when n>=50))				5.003	95% Adjusted Gamma UCL (use when n<50)				5.081			
548													
549	<b>Lognormal GOF Test</b>												
550	Shapiro Wilk Test Statistic				0.945	<b>Shapiro Wilk Lognormal GOF Test</b>							
551	5% Shapiro Wilk Critical Value				0.897	Data appear Lognormal at 5% Significance Level							
552	Lilliefors Test Statistic				0.142	<b>Lilliefors Lognormal GOF Test</b>							
553	5% Lilliefors Critical Value				0.202	Data appear Lognormal at 5% Significance Level							
554	<b>Data appear Lognormal at 5% Significance Level</b>												
555													
556	<b>Lognormal Statistics</b>												
557	Minimum of Logged Data				0.642	Mean of logged Data				1.385			
558	Maximum of Logged Data				1.917	SD of logged Data				0.387			
559													
560	<b>Assuming Lognormal Distribution</b>												
561	95% H-UCL				5.153	90% Chebyshev (MVUE) UCL				5.481			
562	95% Chebyshev (MVUE) UCL				6.023	97.5% Chebyshev (MVUE) UCL				6.775			
563	99% Chebyshev (MVUE) UCL				8.252								
564													
565	<b>Nonparametric Distribution Free UCL Statistics</b>												
566	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
567													
568	<b>Nonparametric Distribution Free UCLs</b>												
569	95% CLT UCL				4.851	95% Jackknife UCL				4.885			
570	95% Standard Bootstrap UCL				4.836	95% Bootstrap-t UCL				4.868			
571	95% Hall's Bootstrap UCL				4.883	95% Percentile Bootstrap UCL				4.833			
572	95% BCA Bootstrap UCL				4.867								
573	90% Chebyshev(Mean, Sd) UCL				5.332	95% Chebyshev(Mean, Sd) UCL				5.815			
574	97.5% Chebyshev(Mean, Sd) UCL				6.485	99% Chebyshev(Mean, Sd) UCL				7.801			
575													
576	<b>Suggested UCL to Use</b>												
577	95% Student's-t UCL				4.885								
578													
579	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
580	Recommendations are based upon data size, data distribution, and skewness.												
581	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
582	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
583													

	A	B	C	D	E	F	G	H	I	J	K	L		
584														
585	<b>Copper</b>													
586														
587	<b>General Statistics</b>													
588	Total Number of Observations					23		Number of Distinct Observations					23	
589								Number of Missing Observations					0	
590	Minimum					10.4		Mean					170.1	
591	Maximum					1660		Median					60.2	
592	SD					340		Std. Error of Mean					70.9	
593	Coefficient of Variation					1.999		Skewness					4.154	
594														
595	<b>Normal GOF Test</b>													
596	Shapiro Wilk Test Statistic					0.457		<b>Shapiro Wilk GOF Test</b>						
597	5% Shapiro Wilk Critical Value					0.914		Data Not Normal at 5% Significance Level						
598	Lilliefors Test Statistic					0.319		<b>Lilliefors GOF Test</b>						
599	5% Lilliefors Critical Value					0.18		Data Not Normal at 5% Significance Level						
600	<b>Data Not Normal at 5% Significance Level</b>													
601														
602	<b>Assuming Normal Distribution</b>													
603	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>							
604	95% Student's-t UCL					291.8		95% Adjusted-CLT UCL (Chen-1995)					352.3	
605								95% Modified-t UCL (Johnson-1978)					302.1	
606														
607	<b>Gamma GOF Test</b>													
608	A-D Test Statistic					0.93		<b>Anderson-Darling Gamma GOF Test</b>						
609	5% A-D Critical Value					0.791		Data Not Gamma Distributed at 5% Significance Level						
610	K-S Test Statistic					0.135		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
611	5% K-S Critical Value					0.19		Detected data appear Gamma Distributed at 5% Significance Level						
612	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>													
613														
614	<b>Gamma Statistics</b>													
615	k hat (MLE)					0.649		k star (bias corrected MLE)					0.594	
616	Theta hat (MLE)					261.9		Theta star (bias corrected MLE)					286.5	
617	nu hat (MLE)					29.88		nu star (bias corrected)					27.31	
618	MLE Mean (bias corrected)					170.1		MLE Sd (bias corrected)					220.7	
619								Approximate Chi Square Value (0.05)					16.39	
620	Adjusted Level of Significance					0.0389		Adjusted Chi Square Value					15.78	
621														
622	<b>Assuming Gamma Distribution</b>													
623	95% Approximate Gamma UCL (use when n>=50)					283.4		95% Adjusted Gamma UCL (use when n<50)					294.4	
624														
625	<b>Lognormal GOF Test</b>													
626	Shapiro Wilk Test Statistic					0.948		<b>Shapiro Wilk Lognormal GOF Test</b>						
627	5% Shapiro Wilk Critical Value					0.914		Data appear Lognormal at 5% Significance Level						
628	Lilliefors Test Statistic					0.132		<b>Lilliefors Lognormal GOF Test</b>						
629	5% Lilliefors Critical Value					0.18		Data appear Lognormal at 5% Significance Level						
630	<b>Data appear Lognormal at 5% Significance Level</b>													
631														
632	<b>Lognormal Statistics</b>													
633	Minimum of Logged Data					2.342		Mean of logged Data					4.196	
634	Maximum of Logged Data					7.415		SD of logged Data					1.348	
635														
636	<b>Assuming Lognormal Distribution</b>													



	A	B	C	D	E	F	G	H	I	J	K	L
637					95% H-UCL	391.6					90% Chebyshev (MVUE) UCL	308.7
638					95% Chebyshev (MVUE) UCL	378.8					97.5% Chebyshev (MVUE) UCL	476.2
639					99% Chebyshev (MVUE) UCL	667.6						
640												
641	<b>Nonparametric Distribution Free UCL Statistics</b>											
642	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
643												
644	<b>Nonparametric Distribution Free UCLs</b>											
645					95% CLT UCL	286.7					95% Jackknife UCL	291.8
646					95% Standard Bootstrap UCL	281.1					95% Bootstrap-t UCL	533.3
647					95% Hall's Bootstrap UCL	717.9					95% Percentile Bootstrap UCL	308
648					95% BCA Bootstrap UCL	386.9						
649					90% Chebyshev (Mean, Sd) UCL	382.8					95% Chebyshev (Mean, Sd) UCL	479.1
650					97.5% Chebyshev (Mean, Sd) UCL	612.9					99% Chebyshev (Mean, Sd) UCL	875.6
651												
652	<b>Suggested UCL to Use</b>											
653					95% Adjusted Gamma UCL	294.4						
654												
655	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
656	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
657												
658	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
659	Recommendations are based upon data size, data distribution, and skewness.											
660	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
661	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
662												
663												
664	<b>Lead</b>											
665												
666	<b>General Statistics</b>											
667					Total Number of Observations	25					Number of Distinct Observations	25
668											Number of Missing Observations	0
669					Minimum	17					Mean	162.9
670					Maximum	926					Median	97.4
671					SD	196.4					Std. Error of Mean	39.27
672					Coefficient of Variation	1.206					Skewness	2.715
673												
674	<b>Normal GOF Test</b>											
675					Shapiro Wilk Test Statistic	0.704					<b>Shapiro Wilk GOF Test</b>	
676					5% Shapiro Wilk Critical Value	0.918					Data Not Normal at 5% Significance Level	
677					Lilliefors Test Statistic	0.229					<b>Lilliefors GOF Test</b>	
678					5% Lilliefors Critical Value	0.173					Data Not Normal at 5% Significance Level	
679	<b>Data Not Normal at 5% Significance Level</b>											
680												
681	<b>Assuming Normal Distribution</b>											
682	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
683					95% Student's-t UCL	230.1					95% Adjusted-CLT UCL (Chen-1995)	250.3
684											95% Modified-t UCL (Johnson-1978)	233.6
685												
686	<b>Gamma GOF Test</b>											
687					A-D Test Statistic	0.53					<b>Anderson-Darling Gamma GOF Test</b>	
688					5% A-D Critical Value	0.773					Detected data appear Gamma Distributed at 5% Significance Level	
689					K-S Test Statistic	0.161					<b>Kolmogorov-Smirnov Gamma GOF Test</b>	

	A	B	C	D	E	F	G	H	I	J	K	L	
690	5% K-S Critical Value				0.18	Detected data appear Gamma Distributed at 5% Significance Level							
691	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
692													
693	<b>Gamma Statistics</b>												
694	k hat (MLE)				0.992	k star (bias corrected MLE)				0.899			
695	Theta hat (MLE)				164.2	Theta star (bias corrected MLE)				181.1			
696	nu hat (MLE)				49.58	nu star (bias corrected)				44.97			
697	MLE Mean (bias corrected)				162.9	MLE Sd (bias corrected)				171.8			
698					Approximate Chi Square Value (0.05)				30.58				
699	Adjusted Level of Significance				0.0395	Adjusted Chi Square Value				29.78			
700													
701	<b>Assuming Gamma Distribution</b>												
702	95% Approximate Gamma UCL (use when n>=50)				239.5	95% Adjusted Gamma UCL (use when n<50)				246			
703													
704	<b>Lognormal GOF Test</b>												
705	Shapiro Wilk Test Statistic				0.936	<b>Shapiro Wilk Lognormal GOF Test</b>							
706	5% Shapiro Wilk Critical Value				0.918	Data appear Lognormal at 5% Significance Level							
707	Lilliefors Test Statistic				0.169	<b>Lilliefors Lognormal GOF Test</b>							
708	5% Lilliefors Critical Value				0.173	Data appear Lognormal at 5% Significance Level							
709	<b>Data appear Lognormal at 5% Significance Level</b>												
710													
711	<b>Lognormal Statistics</b>												
712	Minimum of Logged Data				2.833	Mean of logged Data				4.51			
713	Maximum of Logged Data				6.831	SD of logged Data				1.146			
714													
715	<b>Assuming Lognormal Distribution</b>												
716	95% H-UCL				328.9	90% Chebyshev (MVUE) UCL				303.5			
717	95% Chebyshev (MVUE) UCL				364.8	97.5% Chebyshev (MVUE) UCL				449.7			
718	99% Chebyshev (MVUE) UCL				616.6								
719													
720	<b>Nonparametric Distribution Free UCL Statistics</b>												
721	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
722													
723	<b>Nonparametric Distribution Free UCLs</b>												
724	95% CLT UCL				227.5	95% Jackknife UCL				230.1			
725	95% Standard Bootstrap UCL				227.2	95% Bootstrap-t UCL				279.7			
726	95% Hall's Bootstrap UCL				525.3	95% Percentile Bootstrap UCL				231.3			
727	95% BCA Bootstrap UCL				260.8								
728	90% Chebyshev(Mean, Sd) UCL				280.7	95% Chebyshev(Mean, Sd) UCL				334.1			
729	97.5% Chebyshev(Mean, Sd) UCL				408.1	99% Chebyshev(Mean, Sd) UCL				553.6			
730													
731	<b>Suggested UCL to Use</b>												
732	95% Adjusted Gamma UCL				246								
733													
734	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
735	Recommendations are based upon data size, data distribution, and skewness.												
736	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
737	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
738													
739													
740	<b>Manganese</b>												
741													
742	<b>General Statistics</b>												

	A	B	C	D	E	F	G	H	I	J	K	L
743	Total Number of Observations					25	Number of Distinct Observations					25
744							Number of Missing Observations					0
745	Minimum					150	Mean					941.8
746	Maximum					3350	Median					630
747	SD					895.2	Std. Error of Mean					179
748	Coefficient of Variation					0.951	Skewness					1.685
749												
750	<b>Normal GOF Test</b>											
751	Shapiro Wilk Test Statistic					0.772	<b>Shapiro Wilk GOF Test</b>					
752	5% Shapiro Wilk Critical Value					0.918	Data Not Normal at 5% Significance Level					
753	Lilliefors Test Statistic					0.206	<b>Lilliefors GOF Test</b>					
754	5% Lilliefors Critical Value					0.173	Data Not Normal at 5% Significance Level					
755	<b>Data Not Normal at 5% Significance Level</b>											
756												
757	<b>Assuming Normal Distribution</b>											
758	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
759	95% Student's-t UCL					1248	95% Adjusted-CLT UCL (Chen-1995)					1301
760							95% Modified-t UCL (Johnson-1978)					1258
761												
762	<b>Gamma GOF Test</b>											
763	A-D Test Statistic					0.721	<b>Anderson-Darling Gamma GOF Test</b>					
764	5% A-D Critical Value					0.761	Detected data appear Gamma Distributed at 5% Significance Level					
765	K-S Test Statistic					0.15	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
766	5% K-S Critical Value					0.178	Detected data appear Gamma Distributed at 5% Significance Level					
767	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
768												
769	<b>Gamma Statistics</b>											
770	k hat (MLE)					1.511	k star (bias corrected MLE)					1.356
771	Theta hat (MLE)					623.3	Theta star (bias corrected MLE)					694.4
772	nu hat (MLE)					75.55	nu star (bias corrected)					67.81
773	MLE Mean (bias corrected)					941.8	MLE Sd (bias corrected)					808.7
774							Approximate Chi Square Value (0.05)					49.86
775	Adjusted Level of Significance					0.0395	Adjusted Chi Square Value					48.81
776												
777	<b>Assuming Gamma Distribution</b>											
778	95% Approximate Gamma UCL (use when n>=50)					1281	95% Adjusted Gamma UCL (use when n<50)					1308
779												
780	<b>Lognormal GOF Test</b>											
781	Shapiro Wilk Test Statistic					0.961	<b>Shapiro Wilk Lognormal GOF Test</b>					
782	5% Shapiro Wilk Critical Value					0.918	Data appear Lognormal at 5% Significance Level					
783	Lilliefors Test Statistic					0.113	<b>Lilliefors Lognormal GOF Test</b>					
784	5% Lilliefors Critical Value					0.173	Data appear Lognormal at 5% Significance Level					
785	<b>Data appear Lognormal at 5% Significance Level</b>											
786												
787	<b>Lognormal Statistics</b>											
788	Minimum of Logged Data					5.011	Mean of logged Data					6.482
789	Maximum of Logged Data					8.117	SD of logged Data					0.859
790												
791	<b>Assuming Lognormal Distribution</b>											
792	95% H-UCL					1419	90% Chebyshev (MVUE) UCL					1455
793	95% Chebyshev (MVUE) UCL					1694	97.5% Chebyshev (MVUE) UCL					2026
794	99% Chebyshev (MVUE) UCL					2679						
795												

	A	B	C	D	E	F	G	H	I	J	K	L	
796	<b>Nonparametric Distribution Free UCL Statistics</b>												
797	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
798													
799	<b>Nonparametric Distribution Free UCLs</b>												
800	95% CLT UCL				1236						95% Jackknife UCL		1248
801	95% Standard Bootstrap UCL				1237						95% Bootstrap-t UCL		1365
802	95% Hall's Bootstrap UCL				1311						95% Percentile Bootstrap UCL		1250
803	95% BCA Bootstrap UCL				1274								
804	90% Chebyshev(Mean, Sd) UCL				1479						95% Chebyshev(Mean, Sd) UCL		1722
805	97.5% Chebyshev(Mean, Sd) UCL				2060						99% Chebyshev(Mean, Sd) UCL		2723
806													
807	<b>Suggested UCL to Use</b>												
808	95% Adjusted Gamma UCL				1308								
809													
810	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
811	Recommendations are based upon data size, data distribution, and skewness.												
812	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
813	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
814													
815													
816	<b>Mercury</b>												
817													
818	<b>General Statistics</b>												
819	Total Number of Observations				21						Number of Distinct Observations		21
820									Number of Missing Observations		0		
821	Minimum				0.022						Mean		0.238
822	Maximum				0.963						Median		0.189
823	SD				0.229						Std. Error of Mean		0.05
824	Coefficient of Variation				0.962						Skewness		2.185
825													
826	<b>Normal GOF Test</b>												
827	Shapiro Wilk Test Statistic				0.746						<b>Shapiro Wilk GOF Test</b>		
828	5% Shapiro Wilk Critical Value				0.908						Data Not Normal at 5% Significance Level		
829	Lilliefors Test Statistic				0.239						<b>Lilliefors GOF Test</b>		
830	5% Lilliefors Critical Value				0.188						Data Not Normal at 5% Significance Level		
831	<b>Data Not Normal at 5% Significance Level</b>												
832													
833	<b>Assuming Normal Distribution</b>												
834	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
835	95% Student's-t UCL				0.324		95% Adjusted-CLT UCL (Chen-1995)				0.346		
836									95% Modified-t UCL (Johnson-1978)		0.328		
837													
838	<b>Gamma GOF Test</b>												
839	A-D Test Statistic				0.433						<b>Anderson-Darling Gamma GOF Test</b>		
840	5% A-D Critical Value				0.76						Detected data appear Gamma Distributed at 5% Significance Level		
841	K-S Test Statistic				0.143						<b>Kolmogorov-Smirnov Gamma GOF Test</b>		
842	5% K-S Critical Value				0.193						Detected data appear Gamma Distributed at 5% Significance Level		
843	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
844													
845	<b>Gamma Statistics</b>												
846	k hat (MLE)				1.428						k star (bias corrected MLE)		1.256
847	Theta hat (MLE)				0.167						Theta star (bias corrected MLE)		0.19
848	nu hat (MLE)				59.98						nu star (bias corrected)		52.74

	A	B	C	D	E	F	G	H	I	J	K	L
849	MLE Mean (bias corrected)					0.238	MLE Sd (bias corrected)					0.213
850						Approximate Chi Square Value (0.05)					37.06	
851	Adjusted Level of Significance					0.0383	Adjusted Chi Square Value					36.05
852												
853	<b>Assuming Gamma Distribution</b>											
854	95% Approximate Gamma UCL (use when n>=50)					0.339	95% Adjusted Gamma UCL (use when n<50)					0.348
855												
856	<b>Lognormal GOF Test</b>											
857	Shapiro Wilk Test Statistic					0.953	<b>Shapiro Wilk Lognormal GOF Test</b>					
858	5% Shapiro Wilk Critical Value					0.908	Data appear Lognormal at 5% Significance Level					
859	Lilliefors Test Statistic					0.155	<b>Lilliefors Lognormal GOF Test</b>					
860	5% Lilliefors Critical Value					0.188	Data appear Lognormal at 5% Significance Level					
861	<b>Data appear Lognormal at 5% Significance Level</b>											
862												
863	<b>Lognormal Statistics</b>											
864	Minimum of Logged Data					-3.817	Mean of logged Data					-1.824
865	Maximum of Logged Data					-0.0377	SD of logged Data					0.955
866												
867	<b>Assuming Lognormal Distribution</b>											
868	95% H-UCL					0.435	90% Chebyshev (MVUE) UCL					0.42
869	95% Chebyshev (MVUE) UCL					0.498	97.5% Chebyshev (MVUE) UCL					0.606
870	99% Chebyshev (MVUE) UCL					0.819						
871												
872	<b>Nonparametric Distribution Free UCL Statistics</b>											
873	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
874												
875	<b>Nonparametric Distribution Free UCLs</b>											
876	95% CLT UCL					0.32	95% Jackknife UCL					0.324
877	95% Standard Bootstrap UCL					0.318	95% Bootstrap-t UCL					0.407
878	95% Hall's Bootstrap UCL					0.813	95% Percentile Bootstrap UCL					0.324
879	95% BCA Bootstrap UCL					0.346						
880	90% Chebyshev(Mean, Sd) UCL					0.388	95% Chebyshev(Mean, Sd) UCL					0.456
881	97.5% Chebyshev(Mean, Sd) UCL					0.55	99% Chebyshev(Mean, Sd) UCL					0.736
882												
883	<b>Suggested UCL to Use</b>											
884	95% Adjusted Gamma UCL					0.348						
885												
886	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
887	Recommendations are based upon data size, data distribution, and skewness.											
888	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
889	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
890												
891	<b>Thallium</b>											
892												
893	<b>General Statistics</b>											
894	Total Number of Observations					16	Number of Distinct Observations					11
895	Number of Detects					6	Number of Non-Detects					10
896	Number of Distinct Detects					6	Number of Distinct Non-Detects					5
897	Minimum Detect					0.7	Minimum Non-Detect					1.1
898	Maximum Detect					4.2	Maximum Non-Detect					13
899	Variance Detects					1.6	Percent Non-Detects					62.5%
900	Mean Detects					1.9	SD Detects					1.265
901	Median Detects					1.65	CV Detects					0.666

	A	B	C	D	E	F	G	H	I	J	K	L
902	Skewness Detects					1.411	Kurtosis Detects					2.186
903	Mean of Logged Detects					0.47	SD of Logged Detects					0.637
904												
905	<b>Normal GOF Test on Detects Only</b>											
906	Shapiro Wilk Test Statistic					0.877	<b>Shapiro Wilk GOF Test</b>					
907	5% Shapiro Wilk Critical Value					0.788	Detected Data appear Normal at 5% Significance Level					
908	Lilliefors Test Statistic					0.24	<b>Lilliefors GOF Test</b>					
909	5% Lilliefors Critical Value					0.325	Detected Data appear Normal at 5% Significance Level					
910	<b>Detected Data appear Normal at 5% Significance Level</b>											
911												
912	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
913	KM Mean					1.335	KM Standard Error of Mean					0.297
914	KM SD					0.949	95% KM (BCA) UCL					1.927
915	95% KM (t) UCL					1.855	95% KM (Percentile Bootstrap) UCL					1.845
916	95% KM (z) UCL					1.823	95% KM Bootstrap t UCL					2.168
917	90% KM Chebyshev UCL					2.226	95% KM Chebyshev UCL					2.629
918	97.5% KM Chebyshev UCL					3.19	99% KM Chebyshev UCL					4.29
919												
920	<b>Gamma GOF Tests on Detected Observations Only</b>											
921	A-D Test Statistic					0.23	<b>Anderson-Darling GOF Test</b>					
922	5% A-D Critical Value					0.701	Detected data appear Gamma Distributed at 5% Significance Level					
923	K-S Test Statistic					0.166	<b>Kolmogorov-Smirnov GOF</b>					
924	5% K-S Critical Value					0.334	Detected data appear Gamma Distributed at 5% Significance Level					
925	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
926												
927	<b>Gamma Statistics on Detected Data Only</b>											
928	k hat (MLE)					3.073	k star (bias corrected MLE)					1.647
929	Theta hat (MLE)					0.618	Theta star (bias corrected MLE)					1.153
930	nu hat (MLE)					36.87	nu star (bias corrected)					19.77
931	Mean (detects)					1.9						
932												
933	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
934	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
935	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
936	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
937	This is especially true when the sample size is small.											
938	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
939	Minimum					0.01	Mean					1.171
940	Maximum					4.2	Median					1.007
941	SD					0.988	CV					0.844
942	k hat (MLE)					1.246	k star (bias corrected MLE)					1.054
943	Theta hat (MLE)					0.939	Theta star (bias corrected MLE)					1.111
944	nu hat (MLE)					39.88	nu star (bias corrected)					33.74
945	Adjusted Level of Significance ( $\beta$ )					0.0335						
946	Approximate Chi Square Value (33.74, $\alpha$ )					21.45	Adjusted Chi Square Value (33.74, $\beta$ )					20.34
947	95% Gamma Approximate UCL (use when $n \geq 50$ )					1.841	95% Gamma Adjusted UCL (use when $n < 50$ )					1.942
948												
949	<b>Estimates of Gamma Parameters using KM Estimates</b>											
950	Mean (KM)					1.335	SD (KM)					0.949
951	Variance (KM)					0.901	SE of Mean (KM)					0.297
952	k hat (KM)					1.976	k star (KM)					1.647
953	nu hat (KM)					63.23	nu star (KM)					52.7
954	theta hat (KM)					0.675	theta star (KM)					0.81

	A	B	C	D	E	F	G	H	I	J	K	L
955	80% gamma percentile (KM)				2.044	90% gamma percentile (KM)				2.719		
956	95% gamma percentile (KM)				3.37	99% gamma percentile (KM)				4.833		
957												
958	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
959	Approximate Chi Square Value (52.70, $\alpha$ )				37.03	Adjusted Chi Square Value (52.70, $\beta$ )				35.54		
960	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				1.9	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				1.979		
961												
962	<b>Lognormal GOF Test on Detected Observations Only</b>											
963	Shapiro Wilk Test Statistic				0.981	<b>Shapiro Wilk GOF Test</b>						
964	5% Shapiro Wilk Critical Value				0.788	Detected Data appear Lognormal at 5% Significance Level						
965	Lilliefors Test Statistic				0.142	<b>Lilliefors GOF Test</b>						
966	5% Lilliefors Critical Value				0.325	Detected Data appear Lognormal at 5% Significance Level						
967	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
968												
969	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
970	Mean in Original Scale				1.266	Mean in Log Scale				0.0712		
971	SD in Original Scale				0.912	SD in Log Scale				0.553		
972	95% t UCL (assumes normality of ROS data)				1.665	95% Percentile Bootstrap UCL				1.656		
973	95% BCA Bootstrap UCL				1.849	95% Bootstrap t UCL				2.116		
974	95% H-UCL (Log ROS)				1.69							
975												
976	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
977	KM Mean (logged)				0.121	KM Geo Mean				1.129		
978	KM SD (logged)				0.527	95% Critical H Value (KM-Log)				2.078		
979	KM Standard Error of Mean (logged)				0.181	95% H-UCL (KM -Log)				1.721		
980	KM SD (logged)				0.527	95% Critical H Value (KM-Log)				2.078		
981	KM Standard Error of Mean (logged)				0.181							
982												
983	<b>DL/2 Statistics</b>											
984	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
985	Mean in Original Scale				2.019	Mean in Log Scale				0.244		
986	SD in Original Scale				2.068	SD in Log Scale				0.959		
987	95% t UCL (Assumes normality)				2.925	95% H-Stat UCL				3.893		
988	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
989												
990	<b>Nonparametric Distribution Free UCL Statistics</b>											
991	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>											
992												
993	<b>Suggested UCL to Use</b>											
994	95% KM (t) UCL				1.855							
995												
996	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
997	Recommendations are based upon data size, data distribution, and skewness.											
998	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
999	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1000												
1001												
1002	<b>Zinc</b>											
1003												
1004	<b>General Statistics</b>											
1005	Total Number of Observations				25	Number of Distinct Observations				23		
1006						Number of Missing Observations				0		
1007	Minimum				10	Mean				311.4		

	A	B	C	D	E	F	G	H	I	J	K	L
1008					Maximum	3300					Median	146
1009					SD	640.3					Std. Error of Mean	128.1
1010					Coefficient of Variation	2.056					Skewness	4.579
1011												
1012	<b>Normal GOF Test</b>											
1013					Shapiro Wilk Test Statistic	0.397					<b>Shapiro Wilk GOF Test</b>	
1014					5% Shapiro Wilk Critical Value	0.918					Data Not Normal at 5% Significance Level	
1015					Lilliefors Test Statistic	0.362					<b>Lilliefors GOF Test</b>	
1016					5% Lilliefors Critical Value	0.173					Data Not Normal at 5% Significance Level	
1017	<b>Data Not Normal at 5% Significance Level</b>											
1018												
1019	<b>Assuming Normal Distribution</b>											
1020	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
1021					95% Student's-t UCL	530.6					95% Adjusted-CLT UCL (Chen-1995)	647.4
1022											95% Modified-t UCL (Johnson-1978)	550.1
1023												
1024	<b>Gamma GOF Test</b>											
1025					A-D Test Statistic	1.303					<b>Anderson-Darling Gamma GOF Test</b>	
1026					5% A-D Critical Value	0.781					Data Not Gamma Distributed at 5% Significance Level	
1027					K-S Test Statistic	0.189					<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
1028					5% K-S Critical Value	0.181					Data Not Gamma Distributed at 5% Significance Level	
1029	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
1030												
1031	<b>Gamma Statistics</b>											
1032					k hat (MLE)	0.799					k star (bias corrected MLE)	0.73
1033					Theta hat (MLE)	389.6					Theta star (bias corrected MLE)	426.6
1034					nu hat (MLE)	39.97					nu star (bias corrected)	36.51
1035					MLE Mean (bias corrected)	311.4					MLE Sd (bias corrected)	364.5
1036											Approximate Chi Square Value (0.05)	23.68
1037					Adjusted Level of Significance	0.0395					Adjusted Chi Square Value	22.97
1038												
1039	<b>Assuming Gamma Distribution</b>											
1040					95% Approximate Gamma UCL (use when n>=50))	480.2					95% Adjusted Gamma UCL (use when n<50)	494.9
1041												
1042	<b>Lognormal GOF Test</b>											
1043					Shapiro Wilk Test Statistic	0.964					<b>Shapiro Wilk Lognormal GOF Test</b>	
1044					5% Shapiro Wilk Critical Value	0.918					Data appear Lognormal at 5% Significance Level	
1045					Lilliefors Test Statistic	0.108					<b>Lilliefors Lognormal GOF Test</b>	
1046					5% Lilliefors Critical Value	0.173					Data appear Lognormal at 5% Significance Level	
1047	<b>Data appear Lognormal at 5% Significance Level</b>											
1048												
1049	<b>Lognormal Statistics</b>											
1050					Minimum of Logged Data	2.303					Mean of logged Data	4.999
1051					Maximum of Logged Data	8.102					SD of logged Data	1.136
1052												
1053	<b>Assuming Lognormal Distribution</b>											
1054					95% H-UCL	525.3					90% Chebyshev (MVUE) UCL	487.3
1055					95% Chebyshev (MVUE) UCL	584.9					97.5% Chebyshev (MVUE) UCL	720.5
1056					99% Chebyshev (MVUE) UCL	986.8						
1057												
1058	<b>Nonparametric Distribution Free UCL Statistics</b>											
1059	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
1060												



	A	B	C	D	E	F	G	H	I	J	K	L	
1061	<b>Nonparametric Distribution Free UCLs</b>												
1062	95% CLT UCL				522.1	95% Jackknife UCL				530.6			
1063	95% Standard Bootstrap UCL				512.1	95% Bootstrap-t UCL				1125			
1064	95% Hall's Bootstrap UCL				1335	95% Percentile Bootstrap UCL				558.9			
1065	95% BCA Bootstrap UCL				715.5								
1066	90% Chebyshev(Mean, Sd) UCL				695.7	95% Chebyshev(Mean, Sd) UCL				869.7			
1067	97.5% Chebyshev(Mean, Sd) UCL				1111	99% Chebyshev(Mean, Sd) UCL				1586			
1068													
1069	<b>Suggested UCL to Use</b>												
1070	95% H-UCL				525.3								
1071													
1072	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1073	Recommendations are based upon data size, data distribution, and skewness.												
1074	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1075	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
1076													
1077	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>												
1078	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>												
1079	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>												
1080	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>												
1081													
1082	<b>Benzo(a)anthracene</b>												
1083													
1084	<b>General Statistics</b>												
1085	Total Number of Observations				36	Number of Distinct Observations				30			
1086	Number of Detects				33	Number of Non-Detects				3			
1087	Number of Distinct Detects				28	Number of Distinct Non-Detects				2			
1088	Minimum Detect				0.038	Minimum Non-Detect				0.35			
1089	Maximum Detect				2.5	Maximum Non-Detect				0.51			
1090	Variance Detects				0.38	Percent Non-Detects				8.333%			
1091	Mean Detects				0.613	SD Detects				0.617			
1092	Median Detects				0.48	CV Detects				1.006			
1093	Skewness Detects				1.827	Kurtosis Detects				3.315			
1094	Mean of Logged Detects				-1.014	SD of Logged Detects				1.159			
1095													
1096	<b>Normal GOF Test on Detects Only</b>												
1097	Shapiro Wilk Test Statistic				0.787	<b>Shapiro Wilk GOF Test</b>							
1098	5% Shapiro Wilk Critical Value				0.931	Detected Data Not Normal at 5% Significance Level							
1099	Lilliefors Test Statistic				0.235	<b>Lilliefors GOF Test</b>							
1100	5% Lilliefors Critical Value				0.152	Detected Data Not Normal at 5% Significance Level							
1101	<b>Detected Data Not Normal at 5% Significance Level</b>												
1102													
1103	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
1104	KM Mean				0.575	KM Standard Error of Mean				0.101			
1105	KM SD				0.596	95% KM (BCA) UCL				0.753			
1106	95% KM (t) UCL				0.746	95% KM (Percentile Bootstrap) UCL				0.736			
1107	95% KM (z) UCL				0.741	95% KM Bootstrap t UCL				0.805			
1108	90% KM Chebyshev UCL				0.878	95% KM Chebyshev UCL				1.016			
1109	97.5% KM Chebyshev UCL				1.206	99% KM Chebyshev UCL				1.58			
1110													
1111	<b>Gamma GOF Tests on Detected Observations Only</b>												
1112	A-D Test Statistic				0.393	<b>Anderson-Darling GOF Test</b>							
1113	5% A-D Critical Value				0.774	Detected data appear Gamma Distributed at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L	
1114	K-S Test Statistic				0.125	Kolmogorov-Smirnov GOF							
1115	5% K-S Critical Value				0.157	Detected data appear Gamma Distributed at 5% Significance Level							
1116	Detected data appear Gamma Distributed at 5% Significance Level												
1117													
1118	Gamma Statistics on Detected Data Only												
1119	k hat (MLE)				1.089	k star (bias corrected MLE)				1.011			
1120	Theta hat (MLE)				0.563	Theta star (bias corrected MLE)				0.607			
1121	nu hat (MLE)				71.9	nu star (bias corrected)				66.7			
1122	Mean (detects)				0.613								
1123													
1124	Gamma ROS Statistics using Imputed Non-Detects												
1125	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1126	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1127	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1128	This is especially true when the sample size is small.												
1129	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1130	Minimum				0.0166	Mean				0.571			
1131	Maximum				2.5	Median				0.41			
1132	SD				0.607	CV				1.063			
1133	k hat (MLE)				0.983	k star (bias corrected MLE)				0.92			
1134	Theta hat (MLE)				0.58	Theta star (bias corrected MLE)				0.62			
1135	nu hat (MLE)				70.79	nu star (bias corrected)				66.22			
1136	Adjusted Level of Significance ( $\beta$ )				0.0428								
1137	Approximate Chi Square Value (66.22, $\alpha$ )				48.5	Adjusted Chi Square Value (66.22, $\beta$ )				47.81			
1138	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.779	95% Gamma Adjusted UCL (use when $n < 50$ )				0.79			
1139													
1140	Estimates of Gamma Parameters using KM Estimates												
1141	Mean (KM)				0.575	SD (KM)				0.596			
1142	Variance (KM)				0.355	SE of Mean (KM)				0.101			
1143	k hat (KM)				0.934	k star (KM)				0.874			
1144	nu hat (KM)				67.22	nu star (KM)				62.95			
1145	theta hat (KM)				0.616	theta star (KM)				0.658			
1146	80% gamma percentile (KM)				0.935	90% gamma percentile (KM)				1.369			
1147	95% gamma percentile (KM)				1.808	99% gamma percentile (KM)				2.837			
1148													
1149	Gamma Kaplan-Meier (KM) Statistics												
1150	Approximate Chi Square Value (62.95, $\alpha$ )				45.7	Adjusted Chi Square Value (62.95, $\beta$ )				45.03			
1151	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.793	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.804			
1152													
1153	Lognormal GOF Test on Detected Observations Only												
1154	Shapiro Wilk Test Statistic				0.934	Shapiro Wilk GOF Test							
1155	5% Shapiro Wilk Critical Value				0.931	Detected Data appear Lognormal at 5% Significance Level							
1156	Lilliefors Test Statistic				0.134	Lilliefors GOF Test							
1157	5% Lilliefors Critical Value				0.152	Detected Data appear Lognormal at 5% Significance Level							
1158	Detected Data appear Lognormal at 5% Significance Level												
1159													
1160	Lognormal ROS Statistics Using Imputed Non-Detects												
1161	Mean in Original Scale				0.573	Mean in Log Scale				-1.098			
1162	SD in Original Scale				0.604	SD in Log Scale				1.146			
1163	95% t UCL (assumes normality of ROS data)				0.744	95% Percentile Bootstrap UCL				0.74			
1164	95% BCA Bootstrap UCL				0.789	95% Bootstrap t UCL				0.806			
1165	95% H-UCL (Log ROS)				1.056								
1166													

	A	B	C	D	E	F	G	H	I	J	K	L
1167	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1168	KM Mean (logged)				-1.107		KM Geo Mean				0.331	
1169	KM SD (logged)				1.16		95% Critical H Value (KM-Log)				2.57	
1170	KM Standard Error of Mean (logged)				0.201		95% H-UCL (KM -Log)				1.072	
1171	KM SD (logged)				1.16		95% Critical H Value (KM-Log)				2.57	
1172	KM Standard Error of Mean (logged)				0.201							
1173												
1174	<b>DL/2 Statistics</b>											
1175	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1176	Mean in Original Scale				0.579		Mean in Log Scale				-1.064	
1177	SD in Original Scale				0.601		SD in Log Scale				1.122	
1178	95% t UCL (Assumes normality)				0.748		95% H-Stat UCL				1.045	
1179	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1180												
1181	<b>Nonparametric Distribution Free UCL Statistics</b>											
1182	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1183												
1184	<b>Suggested UCL to Use</b>											
1185	95% KM Adjusted Gamma UCL				0.804		95% GROS Adjusted Gamma UCL				0.79	
1186												
1187	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1188	Recommendations are based upon data size, data distribution, and skewness.											
1189	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1190	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1191												
1192	<b>Benzo(b)fluoranthene</b>											
1193												
1194	<b>General Statistics</b>											
1195	Total Number of Observations				35		Number of Distinct Observations				27	
1196	Number of Detects				32		Number of Non-Detects				3	
1197	Number of Distinct Detects				27		Number of Distinct Non-Detects				2	
1198	Minimum Detect				0.044		Minimum Non-Detect				0.35	
1199	Maximum Detect				3.6		Maximum Non-Detect				0.51	
1200	Variance Detects				0.616		Percent Non-Detects				8.571%	
1201	Mean Detects				0.748		SD Detects				0.785	
1202	Median Detects				0.475		CV Detects				1.05	
1203	Skewness Detects				2.055		Kurtosis Detects				4.827	
1204	Mean of Logged Detects				-0.806		SD of Logged Detects				1.117	
1205												
1206	<b>Normal GOF Test on Detects Only</b>											
1207	Shapiro Wilk Test Statistic				0.778		<b>Shapiro Wilk GOF Test</b>					
1208	5% Shapiro Wilk Critical Value				0.93		Detected Data Not Normal at 5% Significance Level					
1209	Lilliefors Test Statistic				0.226		<b>Lilliefors GOF Test</b>					
1210	5% Lilliefors Critical Value				0.154		Detected Data Not Normal at 5% Significance Level					
1211	<b>Detected Data Not Normal at 5% Significance Level</b>											
1212												
1213	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1214	KM Mean				0.701		KM Standard Error of Mean				0.13	
1215	KM SD				0.755		95% KM (BCA) UCL				0.923	
1216	95% KM (t) UCL				0.921		95% KM (Percentile Bootstrap) UCL				0.925	
1217	95% KM (z) UCL				0.915		95% KM Bootstrap t UCL				0.995	
1218	90% KM Chebyshev UCL				1.091		95% KM Chebyshev UCL				1.267	
1219	97.5% KM Chebyshev UCL				1.512		99% KM Chebyshev UCL				1.994	

	A	B	C	D	E	F	G	H	I	J	K	L
1220												
1221	<b>Gamma GOF Tests on Detected Observations Only</b>											
1222	A-D Test Statistic				0.336		<b>Anderson-Darling GOF Test</b>					
1223	5% A-D Critical Value				0.773		Detected data appear Gamma Distributed at 5% Significance Level					
1224	K-S Test Statistic				0.109		<b>Kolmogorov-Smirnov GOF</b>					
1225	5% K-S Critical Value				0.16		Detected data appear Gamma Distributed at 5% Significance Level					
1226	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1227												
1228	<b>Gamma Statistics on Detected Data Only</b>											
1229	k hat (MLE)				1.108		k star (bias corrected MLE)				1.025	
1230	Theta hat (MLE)				0.675		Theta star (bias corrected MLE)				0.729	
1231	nu hat (MLE)				70.91		nu star (bias corrected)				65.6	
1232	Mean (detects)				0.748							
1233												
1234	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1235	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1236	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1237	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1238	This is especially true when the sample size is small.											
1239	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1240	Minimum				0.01		Mean				0.692	
1241	Maximum				3.6		Median				0.44	
1242	SD				0.772		CV				1.115	
1243	k hat (MLE)				0.952		k star (bias corrected MLE)				0.889	
1244	Theta hat (MLE)				0.727		Theta star (bias corrected MLE)				0.779	
1245	nu hat (MLE)				66.61		nu star (bias corrected)				62.23	
1246	Adjusted Level of Significance ( $\beta$ )				0.0425							
1247	Approximate Chi Square Value (62.23, $\alpha$ )				45.09		Adjusted Chi Square Value (62.23, $\beta$ )				44.39	
1248	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.955		95% Gamma Adjusted UCL (use when $n < 50$ )				0.97	
1249												
1250	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1251	Mean (KM)				0.701		SD (KM)				0.755	
1252	Variance (KM)				0.57		SE of Mean (KM)				0.13	
1253	k hat (KM)				0.862		k star (KM)				0.807	
1254	nu hat (KM)				60.36		nu star (KM)				56.52	
1255	theta hat (KM)				0.813		theta star (KM)				0.869	
1256	80% gamma percentile (KM)				1.145		90% gamma percentile (KM)				1.701	
1257	95% gamma percentile (KM)				2.267		99% gamma percentile (KM)				3.603	
1258												
1259	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1260	Approximate Chi Square Value (56.52, $\alpha$ )				40.24		Adjusted Chi Square Value (56.52, $\beta$ )				39.59	
1261	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.985		95% Gamma Adjusted KM-UCL (use when $n < 50$ )				1.001	
1262												
1263	<b>Lognormal GOF Test on Detected Observations Only</b>											
1264	Shapiro Wilk Test Statistic				0.959		<b>Shapiro Wilk GOF Test</b>					
1265	5% Shapiro Wilk Critical Value				0.93		Detected Data appear Lognormal at 5% Significance Level					
1266	Lilliefors Test Statistic				0.143		<b>Lilliefors GOF Test</b>					
1267	5% Lilliefors Critical Value				0.154		Detected Data appear Lognormal at 5% Significance Level					
1268	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1269												
1270	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1271	Mean in Original Scale				0.698		Mean in Log Scale				-0.89	
1272	SD in Original Scale				0.767		SD in Log Scale				1.106	

	A	B	C	D	E	F	G	H	I	J	K	L
1273	95% t UCL (assumes normality of ROS data)					0.918	95% Percentile Bootstrap UCL					0.915
1274	95% BCA Bootstrap UCL					0.987	95% Bootstrap t UCL					0.998
1275	95% H-UCL (Log ROS)					1.236						
1276												
1277	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1278	KM Mean (logged)					-0.894	KM Geo Mean					0.409
1279	KM SD (logged)					1.114	95% Critical H Value (KM-Log)					2.598
1280	KM Standard Error of Mean (logged)					0.196	95% H-UCL (KM -Log)					1.25
1281	KM SD (logged)					1.114	95% Critical H Value (KM-Log)					2.598
1282	KM Standard Error of Mean (logged)					0.196						
1283												
1284	<b>DL/2 Statistics</b>											
1285	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1286	Mean in Original Scale					0.701	Mean in Log Scale					-0.875
1287	SD in Original Scale					0.766	SD in Log Scale					1.093
1288	95% t UCL (Assumes normality)					0.92	95% H-Stat UCL					1.225
1289	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1290												
1291	<b>Nonparametric Distribution Free UCL Statistics</b>											
1292	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1293												
1294	<b>Suggested UCL to Use</b>											
1295	95% KM Adjusted Gamma UCL					1.001	95% GROS Adjusted Gamma UCL					0.97
1296												
1297	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1298	Recommendations are based upon data size, data distribution, and skewness.											
1299	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1300	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1301												
1302	<b>Benzo(k)fluoranthene</b>											
1303												
1304	<b>General Statistics</b>											
1305	Total Number of Observations					35	Number of Distinct Observations					27
1306	Number of Detects					28	Number of Non-Detects					7
1307	Number of Distinct Detects					24	Number of Distinct Non-Detects					4
1308	Minimum Detect					0.054	Minimum Non-Detect					0.35
1309	Maximum Detect					1.6	Maximum Non-Detect					0.51
1310	Variance Detects					0.149	Percent Non-Detects					20%
1311	Mean Detects					0.448	SD Detects					0.386
1312	Median Detects					0.38	CV Detects					0.86
1313	Skewness Detects					1.539	Kurtosis Detects					2.537
1314	Mean of Logged Detects					-1.198	SD of Logged Detects					0.989
1315												
1316	<b>Normal GOF Test on Detects Only</b>											
1317	Shapiro Wilk Test Statistic					0.846	<b>Shapiro Wilk GOF Test</b>					
1318	5% Shapiro Wilk Critical Value					0.924	Detected Data Not Normal at 5% Significance Level					
1319	Lilliefors Test Statistic					0.192	<b>Lilliefors GOF Test</b>					
1320	5% Lilliefors Critical Value					0.164	Detected Data Not Normal at 5% Significance Level					
1321	<b>Detected Data Not Normal at 5% Significance Level</b>											
1322												
1323	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1324	KM Mean					0.393	KM Standard Error of Mean					0.0628
1325	KM SD					0.36	95% KM (BCA) UCL					0.496

	A	B	C	D	E	F	G	H	I	J	K	L
1326				95% KM (t) UCL	0.5				95% KM (Percentile Bootstrap) UCL			0.498
1327				95% KM (z) UCL	0.497				95% KM Bootstrap t UCL			0.523
1328				90% KM Chebyshev UCL	0.582				95% KM Chebyshev UCL			0.667
1329				97.5% KM Chebyshev UCL	0.786				99% KM Chebyshev UCL			1.019
1330												
1331	<b>Gamma GOF Tests on Detected Observations Only</b>											
1332				A-D Test Statistic	0.409				<b>Anderson-Darling GOF Test</b>			
1333				5% A-D Critical Value	0.765				Detected data appear Gamma Distributed at 5% Significance Level			
1334				K-S Test Statistic	0.0982				<b>Kolmogorov-Smirnov GOF</b>			
1335				5% K-S Critical Value	0.169				Detected data appear Gamma Distributed at 5% Significance Level			
1336	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1337												
1338	<b>Gamma Statistics on Detected Data Only</b>											
1339				k hat (MLE)	1.409				k star (bias corrected MLE)			1.282
1340				Theta hat (MLE)	0.318				Theta star (bias corrected MLE)			0.35
1341				nu hat (MLE)	78.89				nu star (bias corrected)			71.77
1342				Mean (detects)	0.448							
1343												
1344	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1345	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1346	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1347	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1348	This is especially true when the sample size is small.											
1349	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1350				Minimum	0.0165				Mean			0.387
1351				Maximum	1.6				Median			0.28
1352				SD	0.367				CV			0.948
1353				k hat (MLE)	1.26				k star (bias corrected MLE)			1.171
1354				Theta hat (MLE)	0.307				Theta star (bias corrected MLE)			0.33
1355				nu hat (MLE)	88.2				nu star (bias corrected)			81.97
1356				Adjusted Level of Significance ( $\beta$ )	0.0425							
1357				Approximate Chi Square Value (81.97, $\alpha$ )	62.11				Adjusted Chi Square Value (81.97, $\beta$ )			61.29
1358				95% Gamma Approximate UCL (use when $n \geq 50$ )	0.511				95% Gamma Adjusted UCL (use when $n < 50$ )			0.517
1359												
1360	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1361				Mean (KM)	0.393				SD (KM)			0.36
1362				Variance (KM)	0.13				SE of Mean (KM)			0.0628
1363				k hat (KM)	1.195				k star (KM)			1.111
1364				nu hat (KM)	83.62				nu star (KM)			77.78
1365				theta hat (KM)	0.329				theta star (KM)			0.354
1366				80% gamma percentile (KM)	0.627				90% gamma percentile (KM)			0.883
1367				95% gamma percentile (KM)	1.136				99% gamma percentile (KM)			1.719
1368												
1369	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1370				Approximate Chi Square Value (77.78, $\alpha$ )	58.47				Adjusted Chi Square Value (77.78, $\beta$ )			57.67
1371				95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.523				95% Gamma Adjusted KM-UCL (use when $n < 50$ )			0.531
1372												
1373	<b>Lognormal GOF Test on Detected Observations Only</b>											
1374				Shapiro Wilk Test Statistic	0.925				<b>Shapiro Wilk GOF Test</b>			
1375				5% Shapiro Wilk Critical Value	0.924				Detected Data appear Lognormal at 5% Significance Level			
1376				Lilliefors Test Statistic	0.155				<b>Lilliefors GOF Test</b>			
1377				5% Lilliefors Critical Value	0.164				Detected Data appear Lognormal at 5% Significance Level			
1378	<b>Detected Data appear Lognormal at 5% Significance Level</b>											

	A	B	C	D	E	F	G	H	I	J	K	L	
1379													
1380	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1381	Mean in Original Scale				0.388	Mean in Log Scale				-1.35			
1382	SD in Original Scale				0.365	SD in Log Scale				0.947			
1383	95% t UCL (assumes normality of ROS data)				0.493	95% Percentile Bootstrap UCL				0.491			
1384	95% BCA Bootstrap UCL				0.504	95% Bootstrap t UCL				0.524			
1385	95% H-UCL (Log ROS)				0.599								
1386													
1387	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1388	KM Mean (logged)				-1.359	KM Geo Mean				0.257			
1389	KM SD (logged)				0.985	95% Critical H Value (KM-Log)				2.437			
1390	KM Standard Error of Mean (logged)				0.182	95% H-UCL (KM -Log)				0.629			
1391	KM SD (logged)				0.985	95% Critical H Value (KM-Log)				2.437			
1392	KM Standard Error of Mean (logged)				0.182								
1393													
1394	<b>DL/2 Statistics</b>												
1395	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>						
1396	Mean in Original Scale				0.397	Mean in Log Scale				-1.288			
1397	SD in Original Scale				0.359	SD in Log Scale				0.902			
1398	95% t UCL (Assumes normality)				0.5	95% H-Stat UCL				0.596			
1399	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
1400													
1401	<b>Nonparametric Distribution Free UCL Statistics</b>												
1402	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>												
1403													
1404	<b>Suggested UCL to Use</b>												
1405	95% KM Adjusted Gamma UCL				0.531	95% GROS Adjusted Gamma UCL				0.517			
1406													
1407	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1408	Recommendations are based upon data size, data distribution, and skewness.												
1409	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1410	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
1411													
1412	<b>Benzo(a)pyrene</b>												
1413													
1414	<b>General Statistics</b>												
1415	Total Number of Observations				36	Number of Distinct Observations				30			
1416	Number of Detects				33	Number of Non-Detects				3			
1417	Number of Distinct Detects				30	Number of Distinct Non-Detects				2			
1418	Minimum Detect				0.01	Minimum Non-Detect				0.35			
1419	Maximum Detect				2.8	Maximum Non-Detect				0.51			
1420	Variance Detects				0.351	Percent Non-Detects				8.333%			
1421	Mean Detects				0.579	SD Detects				0.593			
1422	Median Detects				0.38	CV Detects				1.023			
1423	Skewness Detects				2.101	Kurtosis Detects				5.511			
1424	Mean of Logged Detects				-1.121	SD of Logged Detects				1.28			
1425													
1426	<b>Normal GOF Test on Detects Only</b>												
1427	Shapiro Wilk Test Statistic				0.795	<b>Shapiro Wilk GOF Test</b>							
1428	5% Shapiro Wilk Critical Value				0.931	Detected Data Not Normal at 5% Significance Level							
1429	Lilliefors Test Statistic				0.21	<b>Lilliefors GOF Test</b>							
1430	5% Lilliefors Critical Value				0.152	Detected Data Not Normal at 5% Significance Level							
1431	<b>Detected Data Not Normal at 5% Significance Level</b>												

	A	B	C	D	E	F	G	H	I	J	K	L	
1432													
1433	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
1434	KM Mean				0.546	KM Standard Error of Mean				0.0969			
1435	KM SD				0.571	95% KM (BCA) UCL				0.725			
1436	95% KM (t) UCL				0.71	95% KM (Percentile Bootstrap) UCL				0.712			
1437	95% KM (z) UCL				0.705	95% KM Bootstrap t UCL				0.772			
1438	90% KM Chebyshev UCL				0.836	95% KM Chebyshev UCL				0.968			
1439	97.5% KM Chebyshev UCL				1.151	99% KM Chebyshev UCL				1.51			
1440													
1441	<b>Gamma GOF Tests on Detected Observations Only</b>												
1442	A-D Test Statistic				0.35	<b>Anderson-Darling GOF Test</b>							
1443	5% A-D Critical Value				0.776	Detected data appear Gamma Distributed at 5% Significance Level							
1444	K-S Test Statistic				0.104	<b>Kolmogorov-Smirnov GOF</b>							
1445	5% K-S Critical Value				0.158	Detected data appear Gamma Distributed at 5% Significance Level							
1446	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
1447													
1448	<b>Gamma Statistics on Detected Data Only</b>												
1449	k hat (MLE)				1.004	k star (bias corrected MLE)				0.933			
1450	Theta hat (MLE)				0.577	Theta star (bias corrected MLE)				0.621			
1451	nu hat (MLE)				66.24	nu star (bias corrected)				61.55			
1452	Mean (detects)				0.579								
1453													
1454	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
1455	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1456	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1457	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1458	This is especially true when the sample size is small.												
1459	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1460	Minimum				0.01	Mean				0.541			
1461	Maximum				2.8	Median				0.355			
1462	SD				0.582	CV				1.077			
1463	k hat (MLE)				0.948	k star (bias corrected MLE)				0.888			
1464	Theta hat (MLE)				0.57	Theta star (bias corrected MLE)				0.609			
1465	nu hat (MLE)				68.28	nu star (bias corrected)				63.92			
1466	Adjusted Level of Significance ( $\beta$ )				0.0428								
1467	Approximate Chi Square Value (63.92, $\alpha$ )				46.53	Adjusted Chi Square Value (63.92, $\beta$ )				45.85			
1468	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.743	95% Gamma Adjusted UCL (use when $n < 50$ )				0.754			
1469													
1470	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1471	Mean (KM)				0.546	SD (KM)				0.571			
1472	Variance (KM)				0.326	SE of Mean (KM)				0.0969			
1473	k hat (KM)				0.913	k star (KM)				0.856			
1474	nu hat (KM)				65.76	nu star (KM)				61.62			
1475	theta hat (KM)				0.598	theta star (KM)				0.638			
1476	80% gamma percentile (KM)				0.888	90% gamma percentile (KM)				1.306			
1477	95% gamma percentile (KM)				1.728	99% gamma percentile (KM)				2.721			
1478													
1479	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1480	Approximate Chi Square Value (61.62, $\alpha$ )				44.56	Adjusted Chi Square Value (61.62, $\beta$ )				43.9			
1481	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.755	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.766			
1482													
1483	<b>Lognormal GOF Test on Detected Observations Only</b>												
1484	Shapiro Wilk Test Statistic				0.927	<b>Shapiro Wilk GOF Test</b>							



	A	B	C	D	E	F	G	H	I	J	K	L
1485	5% Shapiro Wilk Critical Value					0.931	Detected Data Not Lognormal at 5% Significance Level					
1486	Lilliefors Test Statistic					0.161	Lilliefors GOF Test					
1487	5% Lilliefors Critical Value					0.152	Detected Data Not Lognormal at 5% Significance Level					
1488	Detected Data Not Lognormal at 5% Significance Level											
1489												
1490	Lognormal ROS Statistics Using Imputed Non-Detects											
1491	Mean in Original Scale					0.542	Mean in Log Scale					-1.203
1492	SD in Original Scale					0.581	SD in Log Scale					1.258
1493	95% t UCL (assumes normality of ROS data)					0.705	95% Percentile Bootstrap UCL					0.713
1494	95% BCA Bootstrap UCL					0.738	95% Bootstrap t UCL					0.774
1495	95% H-UCL (Log ROS)					1.175						
1496												
1497	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1498	KM Mean (logged)					-1.208	KM Geo Mean					0.299
1499	KM SD (logged)					1.279	95% Critical H Value (KM-Log)					2.718
1500	KM Standard Error of Mean (logged)					0.224	95% H-UCL (KM -Log)					1.219
1501	KM SD (logged)					1.279	95% Critical H Value (KM-Log)					2.718
1502	KM Standard Error of Mean (logged)					0.224						
1503												
1504	DL/2 Statistics											
1505	DL/2 Normal						DL/2 Log-Transformed					
1506	Mean in Original Scale					0.548	Mean in Log Scale					-1.162
1507	SD in Original Scale					0.577	SD in Log Scale					1.233
1508	95% t UCL (Assumes normality)					0.71	95% H-Stat UCL					1.165
1509	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1510												
1511	Nonparametric Distribution Free UCL Statistics											
1512	Detected Data appear Gamma Distributed at 5% Significance Level											
1513												
1514	Suggested UCL to Use											
1515	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					0.766						
1516												
1517	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1518	Recommendations are based upon data size, data distribution, and skewness.											
1519	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1520	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1521												
1522	Chrysene											
1523												
1524	General Statistics											
1525	Total Number of Observations					37	Number of Distinct Observations					34
1526	Number of Detects					34	Number of Non-Detects					3
1527	Number of Distinct Detects					32	Number of Distinct Non-Detects					2
1528	Minimum Detect					0.052	Minimum Non-Detect					0.35
1529	Maximum Detect					2.9	Maximum Non-Detect					0.51
1530	Variance Detects					0.401	Percent Non-Detects					8.108%
1531	Mean Detects					0.634	SD Detects					0.633
1532	Median Detects					0.48	CV Detects					0.999
1533	Skewness Detects					1.96	Kurtosis Detects					4.394
1534	Mean of Logged Detects					-0.943	SD of Logged Detects					1.089
1535												
1536	Normal GOF Test on Detects Only											
1537	Shapiro Wilk Test Statistic					0.795	Shapiro Wilk GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
1538	5% Shapiro Wilk Critical Value					0.933	Detected Data Not Normal at 5% Significance Level					
1539	Lilliefors Test Statistic					0.214	Lilliefors GOF Test					
1540	5% Lilliefors Critical Value					0.15	Detected Data Not Normal at 5% Significance Level					
1541	Detected Data Not Normal at 5% Significance Level											
1542												
1543	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1544	KM Mean					0.596	KM Standard Error of Mean					0.102
1545	KM SD					0.613	95% KM (BCA) UCL					0.773
1546	95% KM (t) UCL					0.769	95% KM (Percentile Bootstrap) UCL					0.773
1547	95% KM (z) UCL					0.764	95% KM Bootstrap t UCL					0.819
1548	90% KM Chebyshev UCL					0.903	95% KM Chebyshev UCL					1.042
1549	97.5% KM Chebyshev UCL					1.235	99% KM Chebyshev UCL					1.614
1550												
1551	Gamma GOF Tests on Detected Observations Only											
1552	A-D Test Statistic					0.383	Anderson-Darling GOF Test					
1553	5% A-D Critical Value					0.772	Detected data appear Gamma Distributed at 5% Significance Level					
1554	K-S Test Statistic					0.11	Kolmogorov-Smirnov GOF					
1555	5% K-S Critical Value					0.155	Detected data appear Gamma Distributed at 5% Significance Level					
1556	Detected data appear Gamma Distributed at 5% Significance Level											
1557												
1558	Gamma Statistics on Detected Data Only											
1559	k hat (MLE)					1.164	k star (bias corrected MLE)					1.081
1560	Theta hat (MLE)					0.545	Theta star (bias corrected MLE)					0.587
1561	nu hat (MLE)					79.15	nu star (bias corrected)					73.5
1562	Mean (detects)					0.634						
1563												
1564	Gamma ROS Statistics using Imputed Non-Detects											
1565	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1566	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1567	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1568	This is especially true when the sample size is small.											
1569	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1570	Minimum					0.01	Mean					0.591
1571	Maximum					2.9	Median					0.44
1572	SD					0.625	CV					1.058
1573	k hat (MLE)					1.011	k star (bias corrected MLE)					0.947
1574	Theta hat (MLE)					0.584	Theta star (bias corrected MLE)					0.624
1575	nu hat (MLE)					74.78	nu star (bias corrected)					70.05
1576	Adjusted Level of Significance ( $\beta$ )					0.0431						
1577	Approximate Chi Square Value (70.05, $\alpha$ )					51.78	Adjusted Chi Square Value (70.05, $\beta$ )					51.1
1578	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.799	95% Gamma Adjusted UCL (use when $n < 50$ )					0.81
1579												
1580	Estimates of Gamma Parameters using KM Estimates											
1581	Mean (KM)					0.596	SD (KM)					0.613
1582	Variance (KM)					0.375	SE of Mean (KM)					0.102
1583	k hat (KM)					0.945	k star (KM)					0.887
1584	nu hat (KM)					69.94	nu star (KM)					65.6
1585	theta hat (KM)					0.63	theta star (KM)					0.672
1586	80% gamma percentile (KM)					0.967	90% gamma percentile (KM)					1.413
1587	95% gamma percentile (KM)					1.863	99% gamma percentile (KM)					2.916
1588												
1589	Gamma Kaplan-Meier (KM) Statistics											
1590	Approximate Chi Square Value (65.60, $\alpha$ )					47.97	Adjusted Chi Square Value (65.60, $\beta$ )					47.31

	A	B	C	D	E	F	G	H	I	J	K	L
1591	95% Gamma Approximate KM-UCL (use when n>=50)					0.815	95% Gamma Adjusted KM-UCL (use when n<50)					0.826
1592												
1593	<b>Lognormal GOF Test on Detected Observations Only</b>											
1594	Shapiro Wilk Test Statistic					0.944	Shapiro Wilk GOF Test					
1595	5% Shapiro Wilk Critical Value					0.933	Detected Data appear Lognormal at 5% Significance Level					
1596	Lilliefors Test Statistic					0.127	Lilliefors GOF Test					
1597	5% Lilliefors Critical Value					0.15	Detected Data appear Lognormal at 5% Significance Level					
1598	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1599												
1600	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1601	Mean in Original Scale					0.595	Mean in Log Scale					-1.023
1602	SD in Original Scale					0.621	SD in Log Scale					1.081
1603	95% t UCL (assumes normality of ROS data)					0.767	95% Percentile Bootstrap UCL					0.774
1604	95% BCA Bootstrap UCL					0.81	95% Bootstrap t UCL					0.832
1605	95% H-UCL (Log ROS)					1.008						
1606												
1607	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1608	KM Mean (logged)					-1.034	KM Geo Mean					0.356
1609	KM SD (logged)					1.09	95% Critical H Value (KM-Log)					2.494
1610	KM Standard Error of Mean (logged)					0.185	95% H-UCL (KM -Log)					1.014
1611	KM SD (logged)					1.09	95% Critical H Value (KM-Log)					2.494
1612	KM Standard Error of Mean (logged)					0.185						
1613												
1614	<b>DL/2 Statistics</b>											
1615	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1616	Mean in Original Scale					0.599	Mean in Log Scale					-0.998
1617	SD in Original Scale					0.618	SD in Log Scale					1.061
1618	95% t UCL (Assumes normality)					0.771	95% H-Stat UCL					0.999
1619	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1620												
1621	<b>Nonparametric Distribution Free UCL Statistics</b>											
1622	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1623												
1624	<b>Suggested UCL to Use</b>											
1625	95% KM Adjusted Gamma UCL					0.826	95% GROS Adjusted Gamma UCL					0.81
1626												
1627	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1628	Recommendations are based upon data size, data distribution, and skewness.											
1629	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1630	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1631												
1632	<b>Dibenz(a,h)anthracene</b>											
1633												
1634	<b>General Statistics</b>											
1635	Total Number of Observations					22	Number of Distinct Observations					14
1636	Number of Detects					10	Number of Non-Detects					12
1637	Number of Distinct Detects					9	Number of Distinct Non-Detects					5
1638	Minimum Detect					0.064	Minimum Non-Detect					0.35
1639	Maximum Detect					0.45	Maximum Non-Detect					0.51
1640	Variance Detects					0.0152	Percent Non-Detects					54.55%
1641	Mean Detects					0.152	SD Detects					0.123
1642	Median Detects					0.107	CV Detects					0.813
1643	Skewness Detects					2.005	Kurtosis Detects					3.614

	A	B	C	D	E	F	G	H	I	J	K	L
1644	Mean of Logged Detects					-2.096	SD of Logged Detects					0.627
1645												
1646	<b>Normal GOF Test on Detects Only</b>											
1647	Shapiro Wilk Test Statistic					0.707	<b>Shapiro Wilk GOF Test</b>					
1648	5% Shapiro Wilk Critical Value					0.842	Detected Data Not Normal at 5% Significance Level					
1649	Lilliefors Test Statistic					0.338	<b>Lilliefors GOF Test</b>					
1650	5% Lilliefors Critical Value					0.262	Detected Data Not Normal at 5% Significance Level					
1651	<b>Detected Data Not Normal at 5% Significance Level</b>											
1652												
1653	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1654	KM Mean					0.134	KM Standard Error of Mean					0.0272
1655	KM SD					0.0949	95% KM (BCA) UCL					0.184
1656	95% KM (t) UCL					0.181	95% KM (Percentile Bootstrap) UCL					0.179
1657	95% KM (z) UCL					0.179	95% KM Bootstrap t UCL					0.26
1658	90% KM Chebyshev UCL					0.216	95% KM Chebyshev UCL					0.253
1659	97.5% KM Chebyshev UCL					0.304	99% KM Chebyshev UCL					0.405
1660												
1661	<b>Gamma GOF Tests on Detected Observations Only</b>											
1662	A-D Test Statistic					0.865	<b>Anderson-Darling GOF Test</b>					
1663	5% A-D Critical Value					0.734	Detected Data Not Gamma Distributed at 5% Significance Level					
1664	K-S Test Statistic					0.266	<b>Kolmogorov-Smirnov GOF</b>					
1665	5% K-S Critical Value					0.269	Detected data appear Gamma Distributed at 5% Significance Level					
1666	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1667												
1668	<b>Gamma Statistics on Detected Data Only</b>											
1669	k hat (MLE)					2.536	k star (bias corrected MLE)					1.842
1670	Theta hat (MLE)					0.0598	Theta star (bias corrected MLE)					0.0824
1671	nu hat (MLE)					50.72	nu star (bias corrected)					36.84
1672	Mean (detects)					0.152						
1673												
1674	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1675	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1676	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1677	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1678	This is especially true when the sample size is small.											
1679	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1680	Minimum					0.0242	Mean					0.134
1681	Maximum					0.45	Median					0.112
1682	SD					0.0932	CV					0.696
1683	k hat (MLE)					2.923	k star (bias corrected MLE)					2.555
1684	Theta hat (MLE)					0.0458	Theta star (bias corrected MLE)					0.0524
1685	nu hat (MLE)					128.6	nu star (bias corrected)					112.4
1686	Adjusted Level of Significance ( $\beta$ )					0.0386						
1687	Approximate Chi Square Value (112.42, $\alpha$ )					88.95	Adjusted Chi Square Value (112.42, $\beta$ )					87.39
1688	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.169	95% Gamma Adjusted UCL (use when $n < 50$ )					0.172
1689												
1690	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1691	Mean (KM)					0.134	SD (KM)					0.0949
1692	Variance (KM)					0.00902	SE of Mean (KM)					0.0272
1693	k hat (KM)					2.002	k star (KM)					1.759
1694	nu hat (KM)					88.08	nu star (KM)					77.4
1695	theta hat (KM)					0.0671	theta star (KM)					0.0764
1696	80% gamma percentile (KM)					0.204	90% gamma percentile (KM)					0.269

	A	B	C	D	E	F	G	H	I	J	K	L
1697	95% gamma percentile (KM)					0.332	99% gamma percentile (KM)					0.472
1698												
1699	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1700	Approximate Chi Square Value (77.40, $\alpha$ )					58.13	Adjusted Chi Square Value (77.40, $\beta$ )					56.89
1701	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.179	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.183
1702												
1703	<b>Lognormal GOF Test on Detected Observations Only</b>											
1704	Shapiro Wilk Test Statistic					0.865	<b>Shapiro Wilk GOF Test</b>					
1705	5% Shapiro Wilk Critical Value					0.842	Detected Data appear Lognormal at 5% Significance Level					
1706	Lilliefors Test Statistic					0.218	<b>Lilliefors GOF Test</b>					
1707	5% Lilliefors Critical Value					0.262	Detected Data appear Lognormal at 5% Significance Level					
1708	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1709												
1710	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1711	Mean in Original Scale					0.132	Mean in Log Scale					-2.161
1712	SD in Original Scale					0.0885	SD in Log Scale					0.494
1713	95% t UCL (assumes normality of ROS data)					0.165	95% Percentile Bootstrap UCL					0.165
1714	95% BCA Bootstrap UCL					0.176	95% Bootstrap t UCL					0.196
1715	95% H-UCL (Log ROS)					0.161						
1716												
1717	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1718	KM Mean (logged)					-2.171	KM Geo Mean					0.114
1719	KM SD (logged)					0.52	95% Critical H Value (KM-Log)					2.016
1720	KM Standard Error of Mean (logged)					0.16	95% H-UCL (KM -Log)					0.164
1721	KM SD (logged)					0.52	95% Critical H Value (KM-Log)					2.016
1722	KM Standard Error of Mean (logged)					0.16						
1723												
1724	<b>DL/2 Statistics</b>											
1725	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1726	Mean in Original Scale					0.172	Mean in Log Scale					-1.867
1727	SD in Original Scale					0.0849	SD in Log Scale					0.471
1728	95% t UCL (Assumes normality)					0.203	95% H-Stat UCL					0.211
1729	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1730												
1731	<b>Nonparametric Distribution Free UCL Statistics</b>											
1732	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											
1733												
1734	<b>Suggested UCL to Use</b>											
1735	95% KM Adjusted Gamma UCL					0.183	95% GROS Adjusted Gamma UCL					0.172
1736												
1737	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1738	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1739												
1740	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1741	Recommendations are based upon data size, data distribution, and skewness.											
1742	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1743	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1744												
1745	<b>Indeno(1,2,3-cd)pyrene</b>											
1746												
1747	<b>General Statistics</b>											
1748	Total Number of Observations					31	Number of Distinct Observations					23
1749	Number of Detects					26	Number of Non-Detects					5

	A	B	C	D	E	F	G	H	I	J	K	L
1750	Number of Distinct Detects					21	Number of Distinct Non-Detects					2
1751	Minimum Detect					0.04	Minimum Non-Detect					0.35
1752	Maximum Detect					1.9	Maximum Non-Detect					0.51
1753	Variance Detects					0.168	Percent Non-Detects					16.13%
1754	Mean Detects					0.373	SD Detects					0.41
1755	Median Detects					0.215	CV Detects					1.1
1756	Skewness Detects					2.491	Kurtosis Detects					7.212
1757	Mean of Logged Detects					-1.428	SD of Logged Detects					0.964
1758												
1759	<b>Normal GOF Test on Detects Only</b>											
1760	Shapiro Wilk Test Statistic					0.71	<b>Shapiro Wilk GOF Test</b>					
1761	5% Shapiro Wilk Critical Value					0.92	Detected Data Not Normal at 5% Significance Level					
1762	Lilliefors Test Statistic					0.243	<b>Lilliefors GOF Test</b>					
1763	5% Lilliefors Critical Value					0.17	Detected Data Not Normal at 5% Significance Level					
1764	<b>Detected Data Not Normal at 5% Significance Level</b>											
1765												
1766	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1767	KM Mean					0.34	KM Standard Error of Mean					0.0694
1768	KM SD					0.377	95% KM (BCA) UCL					0.484
1769	95% KM (t) UCL					0.458	95% KM (Percentile Bootstrap) UCL					0.454
1770	95% KM (z) UCL					0.455	95% KM Bootstrap t UCL					0.543
1771	90% KM Chebyshev UCL					0.549	95% KM Chebyshev UCL					0.643
1772	97.5% KM Chebyshev UCL					0.774	99% KM Chebyshev UCL					1.031
1773												
1774	<b>Gamma GOF Tests on Detected Observations Only</b>											
1775	A-D Test Statistic					0.671	<b>Anderson-Darling GOF Test</b>					
1776	5% A-D Critical Value					0.767	Detected data appear Gamma Distributed at 5% Significance Level					
1777	K-S Test Statistic					0.177	<b>Kolmogorov-Smirnov GOF</b>					
1778	5% K-S Critical Value					0.175	Detected Data Not Gamma Distributed at 5% Significance Level					
1779	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1780												
1781	<b>Gamma Statistics on Detected Data Only</b>											
1782	k hat (MLE)					1.275	k star (bias corrected MLE)					1.154
1783	Theta hat (MLE)					0.292	Theta star (bias corrected MLE)					0.323
1784	nu hat (MLE)					66.3	nu star (bias corrected)					59.99
1785	Mean (detects)					0.373						
1786												
1787	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1788	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1789	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1790	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1791	This is especially true when the sample size is small.											
1792	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1793	Minimum					0.01	Mean					0.336
1794	Maximum					1.9	Median					0.21
1795	SD					0.386	CV					1.146
1796	k hat (MLE)					1.159	k star (bias corrected MLE)					1.068
1797	Theta hat (MLE)					0.29	Theta star (bias corrected MLE)					0.315
1798	nu hat (MLE)					71.86	nu star (bias corrected)					66.24
1799	Adjusted Level of Significance ( $\beta$ )					0.0413						
1800	Approximate Chi Square Value (66.24, $\alpha$ )					48.51	Adjusted Chi Square Value (66.24, $\beta$ )					47.67
1801	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.459	95% Gamma Adjusted UCL (use when $n < 50$ )					0.467
1802												

	A	B	C	D	E	F	G	H	I	J	K	L
1803	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1804	Mean (KM)				0.34	SD (KM)				0.377		
1805	Variance (KM)				0.142	SE of Mean (KM)				0.0694		
1806	k hat (KM)				0.815	k star (KM)				0.758		
1807	nu hat (KM)				50.54	nu star (KM)				46.98		
1808	theta hat (KM)				0.418	theta star (KM)				0.449		
1809	80% gamma percentile (KM)				0.558	90% gamma percentile (KM)				0.839		
1810	95% gamma percentile (KM)				1.126	99% gamma percentile (KM)				1.808		
1811												
1812	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1813	Approximate Chi Square Value (46.98, $\alpha$ )				32.25	Adjusted Chi Square Value (46.98, $\beta$ )				31.57		
1814	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.496	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.506		
1815												
1816	<b>Lognormal GOF Test on Detected Observations Only</b>											
1817	Shapiro Wilk Test Statistic				0.964	<b>Shapiro Wilk GOF Test</b>						
1818	5% Shapiro Wilk Critical Value				0.92	Detected Data appear Lognormal at 5% Significance Level						
1819	Lilliefors Test Statistic				0.134	<b>Lilliefors GOF Test</b>						
1820	5% Lilliefors Critical Value				0.17	Detected Data appear Lognormal at 5% Significance Level						
1821	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1822												
1823	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1824	Mean in Original Scale				0.339	Mean in Log Scale				-1.503		
1825	SD in Original Scale				0.383	SD in Log Scale				0.913		
1826	95% t UCL (assumes normality of ROS data)				0.456	95% Percentile Bootstrap UCL				0.459		
1827	95% BCA Bootstrap UCL				0.502	95% Bootstrap t UCL				0.547		
1828	95% H-UCL (Log ROS)				0.497							
1829												
1830	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1831	KM Mean (logged)				-1.508	KM Geo Mean				0.221		
1832	KM SD (logged)				0.922	95% Critical H Value (KM-Log)				2.335		
1833	KM Standard Error of Mean (logged)				0.177	95% H-UCL (KM -Log)				0.502		
1834	KM SD (logged)				0.922	95% Critical H Value (KM-Log)				2.335		
1835	KM Standard Error of Mean (logged)				0.177							
1836												
1837	<b>DL/2 Statistics</b>											
1838	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
1839	Mean in Original Scale				0.343	Mean in Log Scale				-1.466		
1840	SD in Original Scale				0.381	SD in Log Scale				0.887		
1841	95% t UCL (Assumes normality)				0.459	95% H-Stat UCL				0.496		
1842	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1843												
1844	<b>Nonparametric Distribution Free UCL Statistics</b>											
1845	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											
1846												
1847	<b>Suggested UCL to Use</b>											
1848	95% KM Adjusted Gamma UCL				0.506	95% GROS Adjusted Gamma UCL				0.467		
1849												
1850	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1851	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1852												
1853	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1854	Recommendations are based upon data size, data distribution, and skewness.											
1855	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											

	A	B	C	D	E	F	G	H	I	J	K	L
1856	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1857												



	A	B	C	D	E	F	G	H	I	J	K	L	
1	<b>UCL Statistics for Data Sets with Non-Detects</b>												
2													
3	User Selected Options												
4	Date/Time of Computation		ProUCL 5.11/20/2020 10:29:59 PM										
5	From File		AreaC_WB_SubSoil_prouclin.xls										
6	Full Precision		OFF										
7	Confidence Coefficient		95%										
8	Number of Bootstrap Operations		2000										
9													
10													
11	<b>Aluminum</b>												
12													
13	<b>General Statistics</b>												
14	Total Number of Observations				52		Number of Distinct Observations				50		
15									Number of Missing Observations				0
16	Minimum				98		Mean				7773		
17	Maximum				22900		Median				5910		
18	SD				5656		Std. Error of Mean				784.4		
19	Coefficient of Variation				0.728		Skewness				1.15		
20													
21	<b>Normal GOF Test</b>												
22	Shapiro Wilk Test Statistic				0.867		<b>Shapiro Wilk GOF Test</b>						
23	5% Shapiro Wilk P Value				4.6323E-6		Data Not Normal at 5% Significance Level						
24	Lilliefors Test Statistic				0.17		<b>Lilliefors GOF Test</b>						
25	5% Lilliefors Critical Value				0.122		Data Not Normal at 5% Significance Level						
26	<b>Data Not Normal at 5% Significance Level</b>												
27													
28	<b>Assuming Normal Distribution</b>												
29	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
30	95% Student's-t UCL				9087		95% Adjusted-CLT UCL (Chen-1995)				9197		
31									95% Modified-t UCL (Johnson-1978)				9108
32													
33	<b>Gamma GOF Test</b>												
34	A-D Test Statistic				0.584		<b>Anderson-Darling Gamma GOF Test</b>						
35	5% A-D Critical Value				0.764		Detected data appear Gamma Distributed at 5% Significance Level						
36	K-S Test Statistic				0.0892		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
37	5% K-S Critical Value				0.125		Detected data appear Gamma Distributed at 5% Significance Level						
38	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
39													
40	<b>Gamma Statistics</b>												
41	k hat (MLE)				1.862		k star (bias corrected MLE)				1.768		
42	Theta hat (MLE)				4174		Theta star (bias corrected MLE)				4398		
43	nu hat (MLE)				193.7		nu star (bias corrected)				183.8		
44	MLE Mean (bias corrected)				7773		MLE Sd (bias corrected)				5847		
45									Approximate Chi Square Value (0.05)				153.5
46	Adjusted Level of Significance				0.0454		Adjusted Chi Square Value				152.7		
47													
48	<b>Assuming Gamma Distribution</b>												
49	95% Approximate Gamma UCL (use when n>=50)				9311		95% Adjusted Gamma UCL (use when n<50)				9359		
50													
51	<b>Lognormal GOF Test</b>												
52	Shapiro Wilk Test Statistic				0.883		<b>Shapiro Wilk Lognormal GOF Test</b>						
53	5% Shapiro Wilk P Value				2.7257E-5		Data Not Lognormal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
54	Lilliefors Test Statistic				0.123	Lilliefors Lognormal GOF Test						
55	5% Lilliefors Critical Value				0.122	Data Not Lognormal at 5% Significance Level						
56	Data Not Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				4.585	Mean of logged Data				8.667		
60	Maximum of Logged Data				10.04	SD of logged Data				0.894		
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				11413	90% Chebyshev (MVUE) UCL				12227		
64	95% Chebyshev (MVUE) UCL				13884	97.5% Chebyshev (MVUE) UCL				16184		
65	99% Chebyshev (MVUE) UCL				20701							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				9063	95% Jackknife UCL				9087		
72	95% Standard Bootstrap UCL				9024	95% Bootstrap-t UCL				9234		
73	95% Hall's Bootstrap UCL				9212	95% Percentile Bootstrap UCL				9031		
74	95% BCA Bootstrap UCL				9277							
75	90% Chebyshev(Mean, Sd) UCL				10126	95% Chebyshev(Mean, Sd) UCL				11192		
76	97.5% Chebyshev(Mean, Sd) UCL				12672	99% Chebyshev(Mean, Sd) UCL				15578		
77												
78	Suggested UCL to Use											
79	95% Approximate Gamma UCL				9311							
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												
86	Antimony											
87												
88	General Statistics											
89	Total Number of Observations				32	Number of Distinct Observations				23		
90	Number of Detects				14	Number of Non-Detects				18		
91	Number of Distinct Detects				14	Number of Distinct Non-Detects				9		
92	Minimum Detect				0.9	Minimum Non-Detect				3		
93	Maximum Detect				37	Maximum Non-Detect				8.1		
94	Variance Detects				134.1	Percent Non-Detects				56.25%		
95	Mean Detects				11.31	SD Detects				11.58		
96	Median Detects				9.1	CV Detects				1.023		
97	Skewness Detects				1.339	Kurtosis Detects				1.055		
98	Mean of Logged Detects				1.824	SD of Logged Detects				1.255		
99												
100	Normal GOF Test on Detects Only											
101	Shapiro Wilk Test Statistic				0.823	Shapiro Wilk GOF Test						
102	5% Shapiro Wilk Critical Value				0.874	Detected Data Not Normal at 5% Significance Level						
103	Lilliefors Test Statistic				0.224	Lilliefors GOF Test						
104	5% Lilliefors Critical Value				0.226	Detected Data appear Normal at 5% Significance Level						
105	Detected Data appear Approximate Normal at 5% Significance Level											
106												

	A	B	C	D	E	F	G	H	I	J	K	L	
107	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
108	KM Mean				5.886	KM Standard Error of Mean				1.632			
109	KM SD				8.829	95% KM (BCA) UCL				8.84			
110	95% KM (t) UCL				8.654	95% KM (Percentile Bootstrap) UCL				8.673			
111	95% KM (z) UCL				8.571	95% KM Bootstrap t UCL				10.29			
112	90% KM Chebyshev UCL				10.78	95% KM Chebyshev UCL				13			
113	97.5% KM Chebyshev UCL				16.08	99% KM Chebyshev UCL				22.13			
114													
115	<b>Gamma GOF Tests on Detected Observations Only</b>												
116	A-D Test Statistic				0.396	<b>Anderson-Darling GOF Test</b>							
117	5% A-D Critical Value				0.762	Detected data appear Gamma Distributed at 5% Significance Level							
118	K-S Test Statistic				0.18	<b>Kolmogorov-Smirnov GOF</b>							
119	5% K-S Critical Value				0.235	Detected data appear Gamma Distributed at 5% Significance Level							
120	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
121													
122	<b>Gamma Statistics on Detected Data Only</b>												
123	k hat (MLE)				0.963	k star (bias corrected MLE)				0.804			
124	Theta hat (MLE)				11.75	Theta star (bias corrected MLE)				14.07			
125	nu hat (MLE)				26.96	nu star (bias corrected)				22.52			
126	Mean (detects)				11.31								
127													
128	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
129	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
130	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
131	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
132	This is especially true when the sample size is small.												
133	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
134	Minimum				0.01	Mean				5.445			
135	Maximum				37	Median				2			
136	SD				9.212	CV				1.692			
137	k hat (MLE)				0.294	k star (bias corrected MLE)				0.287			
138	Theta hat (MLE)				18.51	Theta star (bias corrected MLE)				18.95			
139	nu hat (MLE)				18.82	nu star (bias corrected)				18.39			
140	Adjusted Level of Significance ( $\beta$ )				0.0416								
141	Approximate Chi Square Value (18.39, $\alpha$ )				9.674	Adjusted Chi Square Value (18.39, $\beta$ )				9.336			
142	95% Gamma Approximate UCL (use when $n \geq 50$ )				10.35	95% Gamma Adjusted UCL (use when $n < 50$ )				10.73			
143													
144	<b>Estimates of Gamma Parameters using KM Estimates</b>												
145	Mean (KM)				5.886	SD (KM)				8.829			
146	Variance (KM)				77.95	SE of Mean (KM)				1.632			
147	k hat (KM)				0.444	k star (KM)				0.424			
148	nu hat (KM)				28.44	nu star (KM)				27.11			
149	theta hat (KM)				13.24	theta star (KM)				13.89			
150	80% gamma percentile (KM)				9.557	90% gamma percentile (KM)				16.45			
151	95% gamma percentile (KM)				23.97	99% gamma percentile (KM)				42.77			
152													
153	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
154	Approximate Chi Square Value (27.11, $\alpha$ )				16.24	Adjusted Chi Square Value (27.11, $\beta$ )				15.79			
155	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				9.827	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				10.11			
156													
157	<b>Lognormal GOF Test on Detected Observations Only</b>												
158	Shapiro Wilk Test Statistic				0.919	<b>Shapiro Wilk GOF Test</b>							
159	5% Shapiro Wilk Critical Value				0.874	Detected Data appear Lognormal at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L
160	Lilliefors Test Statistic					0.163	Lilliefors GOF Test					
161	5% Lilliefors Critical Value					0.226	Detected Data appear Lognormal at 5% Significance Level					
162	Detected Data appear Lognormal at 5% Significance Level											
163												
164	Lognormal ROS Statistics Using Imputed Non-Detects											
165	Mean in Original Scale					6.021	Mean in Log Scale					1.094
166	SD in Original Scale					8.897	SD in Log Scale					1.112
167	95% t UCL (assumes normality of ROS data)					8.688	95% Percentile Bootstrap UCL					8.659
168	95% BCA Bootstrap UCL					9.533	95% Bootstrap t UCL					10.98
169	95% H-UCL (Log ROS)					9.261						
170												
171	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
172	KM Mean (logged)					1.024	KM Geo Mean					2.786
173	KM SD (logged)					1.111	95% Critical H Value (KM-Log)					2.566
174	KM Standard Error of Mean (logged)					0.228	95% H-UCL (KM -Log)					8.623
175	KM SD (logged)					1.111	95% Critical H Value (KM-Log)					2.566
176	KM Standard Error of Mean (logged)					0.228						
177												
178	DL/2 Statistics											
179	DL/2 Normal						DL/2 Log-Transformed					
180	Mean in Original Scale					6.738	Mean in Log Scale					1.439
181	SD in Original Scale					8.555	SD in Log Scale					0.896
182	95% t UCL (Assumes normality)					9.302	95% H-Stat UCL					9.141
183	DL/2 is not a recommended method, provided for comparisons and historical reasons											
184												
185	Nonparametric Distribution Free UCL Statistics											
186	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
187												
188	Suggested UCL to Use											
189	95% KM (t) UCL					8.654						
190												
191	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
192	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
193												
194	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
195	Recommendations are based upon data size, data distribution, and skewness.											
196	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
197	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
198												
199	<b>Arsenic</b>											
200												
201	General Statistics											
202	Total Number of Observations					51	Number of Distinct Observations					39
203	Number of Detects					49	Number of Non-Detects					2
204	Number of Distinct Detects					38	Number of Distinct Non-Detects					2
205	Minimum Detect					1.4	Minimum Non-Detect					0.8
206	Maximum Detect					31.6	Maximum Non-Detect					9.9
207	Variance Detects					40.27	Percent Non-Detects					3.922%
208	Mean Detects					7.034	SD Detects					6.346
209	Median Detects					5	CV Detects					0.902
210	Skewness Detects					2.019	Kurtosis Detects					4.411
211	Mean of Logged Detects					1.64	SD of Logged Detects					0.772
212												

	A	B	C	D	E	F	G	H	I	J	K	L
213	<b>Normal GOF Test on Detects Only</b>											
214	Shapiro Wilk Test Statistic					0.769	<b>Shapiro Wilk GOF Test</b>					
215	5% Shapiro Wilk Critical Value					0.947	Detected Data Not Normal at 5% Significance Level					
216	Lilliefors Test Statistic					0.207	<b>Lilliefors GOF Test</b>					
217	5% Lilliefors Critical Value					0.126	Detected Data Not Normal at 5% Significance Level					
218	<b>Detected Data Not Normal at 5% Significance Level</b>											
219												
220	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
221	KM Mean					6.858	KM Standard Error of Mean					0.883
222	KM SD					6.235	95% KM (BCA) UCL					8.426
223	95% KM (t) UCL					8.339	95% KM (Percentile Bootstrap) UCL					8.465
224	95% KM (z) UCL					8.311	95% KM Bootstrap t UCL					8.672
225	90% KM Chebyshev UCL					9.509	95% KM Chebyshev UCL					10.71
226	97.5% KM Chebyshev UCL					12.38	99% KM Chebyshev UCL					15.65
227												
228	<b>Gamma GOF Tests on Detected Observations Only</b>											
229	A-D Test Statistic					1.197	<b>Anderson-Darling GOF Test</b>					
230	5% A-D Critical Value					0.765	Detected Data Not Gamma Distributed at 5% Significance Level					
231	K-S Test Statistic					0.133	<b>Kolmogorov-Smirnov GOF</b>					
232	5% K-S Critical Value					0.128	Detected Data Not Gamma Distributed at 5% Significance Level					
233	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
234												
235	<b>Gamma Statistics on Detected Data Only</b>											
236	k hat (MLE)					1.76	k star (bias corrected MLE)					1.666
237	Theta hat (MLE)					3.997	Theta star (bias corrected MLE)					4.223
238	nu hat (MLE)					172.5	nu star (bias corrected)					163.2
239	Mean (detects)					7.034						
240												
241	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
242	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
243	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
244	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
245	This is especially true when the sample size is small.											
246	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
247	Minimum					0.01	Mean					6.837
248	Maximum					31.6	Median					5
249	SD					6.308	CV					0.923
250	k hat (MLE)					1.364	k star (bias corrected MLE)					1.297
251	Theta hat (MLE)					5.011	Theta star (bias corrected MLE)					5.27
252	nu hat (MLE)					139.2	nu star (bias corrected)					132.3
253	Adjusted Level of Significance ( $\beta$ )					0.0453						
254	Approximate Chi Square Value (132.31, $\alpha$ )					106.7	Adjusted Chi Square Value (132.31, $\beta$ )					106.1
255	95% Gamma Approximate UCL (use when $n \geq 50$ )					8.475	95% Gamma Adjusted UCL (use when $n < 50$ )					8.528
256												
257	<b>Estimates of Gamma Parameters using KM Estimates</b>											
258	Mean (KM)					6.858	SD (KM)					6.235
259	Variance (KM)					38.88	SE of Mean (KM)					0.883
260	k hat (KM)					1.21	k star (KM)					1.152
261	nu hat (KM)					123.4	nu star (KM)					117.5
262	theta hat (KM)					5.668	theta star (KM)					5.954
263	80% gamma percentile (KM)					10.9	90% gamma percentile (KM)					15.25
264	95% gamma percentile (KM)					19.55	99% gamma percentile (KM)					29.44
265												

	A	B	C	D	E	F	G	H	I	J	K	L
266	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
267	Approximate Chi Square Value (117.49, $\alpha$ )					93.46	Adjusted Chi Square Value (117.49, $\beta$ )					92.84
268	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					8.622	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					8.679
269												
270	<b>Lognormal GOF Test on Detected Observations Only</b>											
271	Shapiro Wilk Test Statistic					0.951	<b>Shapiro Wilk GOF Test</b>					
272	5% Shapiro Wilk Critical Value					0.947	Detected Data appear Lognormal at 5% Significance Level					
273	Lilliefors Test Statistic					0.126	<b>Lilliefors GOF Test</b>					
274	5% Lilliefors Critical Value					0.126	Detected Data Not Lognormal at 5% Significance Level					
275	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>											
276												
277	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
278	Mean in Original Scale					6.85	Mean in Log Scale					1.597
279	SD in Original Scale					6.293	SD in Log Scale					0.806
280	95% t UCL (assumes normality of ROS data)					8.327	95% Percentile Bootstrap UCL					8.375
281	95% BCA Bootstrap UCL					8.502	95% Bootstrap t UCL					8.848
282	95% H-UCL (Log ROS)					8.698						
283												
284	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
285	KM Mean (logged)					1.597	KM Geo Mean					4.94
286	KM SD (logged)					0.798	95% Critical H Value (KM-Log)					2.11
287	KM Standard Error of Mean (logged)					0.113	95% H-UCL (KM -Log)					8.614
288	KM SD (logged)					0.798	95% Critical H Value (KM-Log)					2.11
289	KM Standard Error of Mean (logged)					0.113						
290												
291	<b>DL/2 Statistics</b>											
292	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
293	Mean in Original Scale					6.863	Mean in Log Scale					1.59
294	SD in Original Scale					6.292	SD in Log Scale					0.837
295	95% t UCL (Assumes normality)					8.339	95% H-Stat UCL					8.969
296	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
297												
298	<b>Nonparametric Distribution Free UCL Statistics</b>											
299	<b>Detected Data appear Approximate Lognormal Distributed at 5% Significance Level</b>											
300												
301	<b>Suggested UCL to Use</b>											
302	KM H-UCL					8.614						
303												
304	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
305	Recommendations are based upon data size, data distribution, and skewness.											
306	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
307	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
308												
309												
310	<b>Barium</b>											
311												
312	<b>General Statistics</b>											
313	Total Number of Observations					52	Number of Distinct Observations					50
314							Number of Missing Observations					0
315	Minimum					4.82	Mean					182.7
316	Maximum					2150	Median					94.6
317	SD					321.4	Std. Error of Mean					44.57
318	Coefficient of Variation					1.759	Skewness					4.826

	A	B	C	D	E	F	G	H	I	J	K	L
319												
320	<b>Normal GOF Test</b>											
321	Shapiro Wilk Test Statistic				0.515		<b>Shapiro Wilk GOF Test</b>					
322	5% Shapiro Wilk P Value				0		Data Not Normal at 5% Significance Level					
323	Lilliefors Test Statistic				0.29		<b>Lilliefors GOF Test</b>					
324	5% Lilliefors Critical Value				0.122		Data Not Normal at 5% Significance Level					
325	<b>Data Not Normal at 5% Significance Level</b>											
326												
327	<b>Assuming Normal Distribution</b>											
328	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
329	95% Student's-t UCL				257.4		95% Adjusted-CLT UCL (Chen-1995)				287.9	
330							95% Modified-t UCL (Johnson-1978)				262.3	
331												
332	<b>Gamma GOF Test</b>											
333	A-D Test Statistic				1.268		<b>Anderson-Darling Gamma GOF Test</b>					
334	5% A-D Critical Value				0.796		Data Not Gamma Distributed at 5% Significance Level					
335	K-S Test Statistic				0.15		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
336	5% K-S Critical Value				0.128		Data Not Gamma Distributed at 5% Significance Level					
337	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
338												
339	<b>Gamma Statistics</b>											
340	k hat (MLE)				0.713		k star (bias corrected MLE)				0.685	
341	Theta hat (MLE)				256.3		Theta star (bias corrected MLE)				266.9	
342	nu hat (MLE)				74.14		nu star (bias corrected)				71.19	
343	MLE Mean (bias corrected)				182.7		MLE Sd (bias corrected)				220.8	
344							Approximate Chi Square Value (0.05)				52.77	
345	Adjusted Level of Significance				0.0454		Adjusted Chi Square Value				52.31	
346												
347	<b>Assuming Gamma Distribution</b>											
348	95% Approximate Gamma UCL (use when n>=50))				246.5		95% Adjusted Gamma UCL (use when n<50)				248.6	
349												
350	<b>Lognormal GOF Test</b>											
351	Shapiro Wilk Test Statistic				0.956		<b>Shapiro Wilk Lognormal GOF Test</b>					
352	5% Shapiro Wilk P Value				0.0987		Data appear Lognormal at 5% Significance Level					
353	Lilliefors Test Statistic				0.126		<b>Lilliefors Lognormal GOF Test</b>					
354	5% Lilliefors Critical Value				0.122		Data Not Lognormal at 5% Significance Level					
355	<b>Data appear Approximate Lognormal at 5% Significance Level</b>											
356												
357	<b>Lognormal Statistics</b>											
358	Minimum of Logged Data				1.573		Mean of logged Data				4.362	
359	Maximum of Logged Data				7.673		SD of logged Data				1.337	
360												
361	<b>Assuming Lognormal Distribution</b>											
362	95% H-UCL				319		90% Chebyshev (MVUE) UCL				318.5	
363	95% Chebyshev (MVUE) UCL				378.5		97.5% Chebyshev (MVUE) UCL				461.9	
364	99% Chebyshev (MVUE) UCL				625.6							
365												
366	<b>Nonparametric Distribution Free UCL Statistics</b>											
367	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
368												
369	<b>Nonparametric Distribution Free UCLs</b>											
370	95% CLT UCL				256		95% Jackknife UCL				257.4	
371	95% Standard Bootstrap UCL				255.4		95% Bootstrap-t UCL				333.6	

	A	B	C	D	E	F	G	H	I	J	K	L
372	95% Hall's Bootstrap UCL					572.3	95% Percentile Bootstrap UCL					260.9
373	95% BCA Bootstrap UCL					295.6						
374	90% Chebyshev(Mean, Sd) UCL					316.4	95% Chebyshev(Mean, Sd) UCL					377
375	97.5% Chebyshev(Mean, Sd) UCL					461	99% Chebyshev(Mean, Sd) UCL					626.2
376												
377	<b>Suggested UCL to Use</b>											
378	95% H-UCL					319						
379												
380	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
381	Recommendations are based upon data size, data distribution, and skewness.											
382	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
383	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
384												
385	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
386	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
387	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
388	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
389												
390												
391	<b>Cadmium</b>											
392												
393	<b>General Statistics</b>											
394	Total Number of Observations				38	Number of Distinct Observations				32		
395						Number of Missing Observations				0		
396	Minimum				0.1	Mean				2.045		
397	Maximum				21.1	Median				0.92		
398	SD				3.811	Std. Error of Mean				0.618		
399	Coefficient of Variation				1.864	Skewness				4.114		
400												
401	<b>Normal GOF Test</b>											
402	Shapiro Wilk Test Statistic				0.482	<b>Shapiro Wilk GOF Test</b>						
403	5% Shapiro Wilk Critical Value				0.938	Data Not Normal at 5% Significance Level						
404	Lilliefors Test Statistic				0.305	<b>Lilliefors GOF Test</b>						
405	5% Lilliefors Critical Value				0.142	Data Not Normal at 5% Significance Level						
406	<b>Data Not Normal at 5% Significance Level</b>											
407												
408	<b>Assuming Normal Distribution</b>											
409	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>						
410	95% Student's-t UCL				3.088	95% Adjusted-CLT UCL (Chen-1995)				3.503		
411						95% Modified-t UCL (Johnson-1978)				3.157		
412												
413	<b>Gamma GOF Test</b>											
414	A-D Test Statistic				1.37	<b>Anderson-Darling Gamma GOF Test</b>						
415	5% A-D Critical Value				0.79	Data Not Gamma Distributed at 5% Significance Level						
416	K-S Test Statistic				0.126	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
417	5% K-S Critical Value				0.149	Detected data appear Gamma Distributed at 5% Significance Level						
418	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
419												
420	<b>Gamma Statistics</b>											
421	k hat (MLE)				0.736	k star (bias corrected MLE)				0.696		
422	Theta hat (MLE)				2.778	Theta star (bias corrected MLE)				2.94		
423	nu hat (MLE)				55.94	nu star (bias corrected)				52.86		
424	MLE Mean (bias corrected)				2.045	MLE Sd (bias corrected)				2.452		



	A	B	C	D	E	F	G	H	I	J	K	L
425							Approximate Chi Square Value (0.05)					37.16
426	Adjusted Level of Significance				0.0434	Adjusted Chi Square Value						36.61
427												
428	<b>Assuming Gamma Distribution</b>											
429	95% Approximate Gamma UCL (use when n>=50)				2.909	95% Adjusted Gamma UCL (use when n<50)					2.953	
430												
431	<b>Lognormal GOF Test</b>											
432	Shapiro Wilk Test Statistic				0.957	<b>Shapiro Wilk Lognormal GOF Test</b>						
433	5% Shapiro Wilk Critical Value				0.938	Data appear Lognormal at 5% Significance Level						
434	Lilliefors Test Statistic				0.132	<b>Lilliefors Lognormal GOF Test</b>						
435	5% Lilliefors Critical Value				0.142	Data appear Lognormal at 5% Significance Level						
436	<b>Data appear Lognormal at 5% Significance Level</b>											
437												
438	<b>Lognormal Statistics</b>											
439	Minimum of Logged Data				-2.303	Mean of logged Data					-0.1	
440	Maximum of Logged Data				3.049	SD of logged Data					1.241	
441												
442	<b>Assuming Lognormal Distribution</b>											
443	95% H-UCL				3.379	90% Chebyshev (MVUE) UCL					3.287	
444	95% Chebyshev (MVUE) UCL				3.921	97.5% Chebyshev (MVUE) UCL					4.801	
445	99% Chebyshev (MVUE) UCL				6.529							
446												
447	<b>Nonparametric Distribution Free UCL Statistics</b>											
448	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
449												
450	<b>Nonparametric Distribution Free UCLs</b>											
451	95% CLT UCL				3.062	95% Jackknife UCL					3.088	
452	95% Standard Bootstrap UCL				3.048	95% Bootstrap-t UCL					5.474	
453	95% Hall's Bootstrap UCL				8.04	95% Percentile Bootstrap UCL					3.112	
454	95% BCA Bootstrap UCL				3.78							
455	90% Chebyshev(Mean, Sd) UCL				3.9	95% Chebyshev(Mean, Sd) UCL					4.74	
456	97.5% Chebyshev(Mean, Sd) UCL				5.906	99% Chebyshev(Mean, Sd) UCL					8.197	
457												
458	<b>Suggested UCL to Use</b>											
459	95% Adjusted Gamma UCL				2.953							
460												
461	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
462	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
463												
464	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
465	Recommendations are based upon data size, data distribution, and skewness.											
466	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
467	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
468												
469												
470	<b>Chromium</b>											
471												
472	<b>General Statistics</b>											
473	Total Number of Observations				49	Number of Distinct Observations					43	
474						Number of Missing Observations					0	
475	Minimum				1.84	Mean					31.94	
476	Maximum				600	Median					12.6	
477	SD				85.2	Std. Error of Mean					12.17	

	A	B	C	D	E	F	G	H	I	J	K	L
478	Coefficient of Variation					2.668	Skewness					6.432
479												
480	<b>Normal GOF Test</b>											
481	Shapiro Wilk Test Statistic					0.304	<b>Shapiro Wilk GOF Test</b>					
482	5% Shapiro Wilk Critical Value					0.947	Data Not Normal at 5% Significance Level					
483	Lilliefors Test Statistic					0.362	<b>Lilliefors GOF Test</b>					
484	5% Lilliefors Critical Value					0.126	Data Not Normal at 5% Significance Level					
485	<b>Data Not Normal at 5% Significance Level</b>											
486												
487	<b>Assuming Normal Distribution</b>											
488	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
489	95% Student's-t UCL					52.35	95% Adjusted-CLT UCL (Chen-1995)					63.91
490							95% Modified-t UCL (Johnson-1978)					54.22
491												
492	<b>Gamma GOF Test</b>											
493	A-D Test Statistic					3.546	<b>Anderson-Darling Gamma GOF Test</b>					
494	5% A-D Critical Value					0.792	Data Not Gamma Distributed at 5% Significance Level					
495	K-S Test Statistic					0.229	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
496	5% K-S Critical Value					0.132	Data Not Gamma Distributed at 5% Significance Level					
497	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
498												
499	<b>Gamma Statistics</b>											
500	k hat (MLE)					0.758	k star (bias corrected MLE)					0.725
501	Theta hat (MLE)					42.12	Theta star (bias corrected MLE)					44.03
502	nu hat (MLE)					74.3	nu star (bias corrected)					71.09
503	MLE Mean (bias corrected)					31.94	MLE Sd (bias corrected)					37.5
504							Approximate Chi Square Value (0.05)					52.68
505	Adjusted Level of Significance					0.0451	Adjusted Chi Square Value					52.2
506												
507	<b>Assuming Gamma Distribution</b>											
508	95% Approximate Gamma UCL (use when n>=50))					43.1	95% Adjusted Gamma UCL (use when n<50)					43.5
509												
510	<b>Lognormal GOF Test</b>											
511	Shapiro Wilk Test Statistic					0.941	<b>Shapiro Wilk Lognormal GOF Test</b>					
512	5% Shapiro Wilk Critical Value					0.947	Data Not Lognormal at 5% Significance Level					
513	Lilliefors Test Statistic					0.122	<b>Lilliefors Lognormal GOF Test</b>					
514	5% Lilliefors Critical Value					0.126	Data appear Lognormal at 5% Significance Level					
515	<b>Data appear Approximate Lognormal at 5% Significance Level</b>											
516												
517	<b>Lognormal Statistics</b>											
518	Minimum of Logged Data					0.61	Mean of logged Data					2.675
519	Maximum of Logged Data					6.397	SD of logged Data					1.033
520												
521	<b>Assuming Lognormal Distribution</b>											
522	95% H-UCL					35.28	90% Chebyshev (MVUE) UCL					37.14
523	95% Chebyshev (MVUE) UCL					42.92	97.5% Chebyshev (MVUE) UCL					50.96
524	99% Chebyshev (MVUE) UCL					66.74						
525												
526	<b>Nonparametric Distribution Free UCL Statistics</b>											
527	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
528												
529	<b>Nonparametric Distribution Free UCLs</b>											
530	95% CLT UCL					51.96	95% Jackknife UCL					52.35

	A	B	C	D	E	F	G	H	I	J	K	L
531	95% Standard Bootstrap UCL					51.65	95% Bootstrap-t UCL					107
532	95% Hall's Bootstrap UCL					123.6	95% Percentile Bootstrap UCL					55.21
533	95% BCA Bootstrap UCL					70.41						
534	90% Chebyshev(Mean, Sd) UCL					68.45	95% Chebyshev(Mean, Sd) UCL					84.99
535	97.5% Chebyshev(Mean, Sd) UCL					107.9	99% Chebyshev(Mean, Sd) UCL					153
536												
537	<b>Suggested UCL to Use</b>											
538	95% H-UCL					35.28						
539												
540	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
541	Recommendations are based upon data size, data distribution, and skewness.											
542	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
543	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
544												
545	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
546	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
547	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
548	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
549												
550	<b>Cobalt</b>											
551												
552	<b>General Statistics</b>											
553	Total Number of Observations				33	Number of Distinct Observations				28		
554	Number of Detects				32	Number of Non-Detects				1		
555	Number of Distinct Detects				27	Number of Distinct Non-Detects				1		
556	Minimum Detect				1.5	Minimum Non-Detect				2.5		
557	Maximum Detect				43.8	Maximum Non-Detect				2.5		
558	Variance Detects				68.03	Percent Non-Detects				3.03%		
559	Mean Detects				6.319	SD Detects				8.248		
560	Median Detects				4.15	CV Detects				1.305		
561	Skewness Detects				3.885	Kurtosis Detects				15.57		
562	Mean of Logged Detects				1.524	SD of Logged Detects				0.668		
563												
564	<b>Normal GOF Test on Detects Only</b>											
565	Shapiro Wilk Test Statistic				0.455	<b>Shapiro Wilk GOF Test</b>						
566	5% Shapiro Wilk Critical Value				0.93	Detected Data Not Normal at 5% Significance Level						
567	Lilliefors Test Statistic				0.376	<b>Lilliefors GOF Test</b>						
568	5% Lilliefors Critical Value				0.154	Detected Data Not Normal at 5% Significance Level						
569	<b>Detected Data Not Normal at 5% Significance Level</b>											
570												
571	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
572	KM Mean				6.187	KM Standard Error of Mean				1.42		
573	KM SD				8.029	95% KM (BCA) UCL				9.191		
574	95% KM (t) UCL				8.592	95% KM (Percentile Bootstrap) UCL				8.642		
575	95% KM (z) UCL				8.523	95% KM Bootstrap t UCL				16.34		
576	90% KM Chebyshev UCL				10.45	95% KM Chebyshev UCL				12.38		
577	97.5% KM Chebyshev UCL				15.06	99% KM Chebyshev UCL				20.32		
578												
579	<b>Gamma GOF Tests on Detected Observations Only</b>											
580	A-D Test Statistic				3.05	<b>Anderson-Darling GOF Test</b>						
581	5% A-D Critical Value				0.762	Detected Data Not Gamma Distributed at 5% Significance Level						
582	K-S Test Statistic				0.245	<b>Kolmogorov-Smirnov GOF</b>						
583	5% K-S Critical Value				0.158	Detected Data Not Gamma Distributed at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
584	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
585												
586	<b>Gamma Statistics on Detected Data Only</b>											
587	k hat (MLE)				1.712		k star (bias corrected MLE)				1.572	
588	Theta hat (MLE)				3.69		Theta star (bias corrected MLE)				4.018	
589	nu hat (MLE)				109.6		nu star (bias corrected)				100.6	
590	Mean (detects)				6.319							
591												
592	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
593	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
594	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
595	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
596	This is especially true when the sample size is small.											
597	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
598	Minimum				0.01		Mean				6.128	
599	Maximum				43.8		Median				4.1	
600	SD				8.192		CV				1.337	
601	k hat (MLE)				1.193		k star (bias corrected MLE)				1.104	
602	Theta hat (MLE)				5.138		Theta star (bias corrected MLE)				5.549	
603	nu hat (MLE)				78.71		nu star (bias corrected)				72.89	
604	Adjusted Level of Significance ( $\beta$ )				0.0419							
605	Approximate Chi Square Value (72.89, $\alpha$ )				54.23		Adjusted Chi Square Value (72.89, $\beta$ )				53.4	
606	95% Gamma Approximate UCL (use when $n \geq 50$ )				8.236		95% Gamma Adjusted UCL (use when $n < 50$ )				8.364	
607												
608	<b>Estimates of Gamma Parameters using KM Estimates</b>											
609	Mean (KM)				6.187		SD (KM)				8.029	
610	Variance (KM)				64.46		SE of Mean (KM)				1.42	
611	k hat (KM)				0.594		k star (KM)				0.56	
612	nu hat (KM)				39.19		nu star (KM)				36.96	
613	theta hat (KM)				10.42		theta star (KM)				11.05	
614	80% gamma percentile (KM)				10.19		90% gamma percentile (KM)				16.34	
615	95% gamma percentile (KM)				22.82		99% gamma percentile (KM)				38.6	
616												
617	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
618	Approximate Chi Square Value (36.96, $\alpha$ )				24.05		Adjusted Chi Square Value (36.96, $\beta$ )				23.51	
619	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				9.511		95% Gamma Adjusted KM-UCL (use when $n < 50$ )				9.728	
620												
621	<b>Lognormal GOF Test on Detected Observations Only</b>											
622	Shapiro Wilk Test Statistic				0.853		<b>Shapiro Wilk GOF Test</b>					
623	5% Shapiro Wilk Critical Value				0.93		Detected Data Not Lognormal at 5% Significance Level					
624	Lilliefors Test Statistic				0.163		<b>Lilliefors GOF Test</b>					
625	5% Lilliefors Critical Value				0.154		Detected Data Not Lognormal at 5% Significance Level					
626	<b>Detected Data Not Lognormal at 5% Significance Level</b>											
627												
628	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
629	Mean in Original Scale				6.18		Mean in Log Scale				1.494	
630	SD in Original Scale				8.157		SD in Log Scale				0.68	
631	95% t UCL (assumes normality of ROS data)				8.585		95% Percentile Bootstrap UCL				8.864	
632	95% BCA Bootstrap UCL				10.04		95% Bootstrap t UCL				16.65	
633	95% H-UCL (Log ROS)				7.219							
634												
635	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
636	KM Mean (logged)				1.498		KM Geo Mean				4.472	

	A	B	C	D	E	F	G	H	I	J	K	L
637					KM SD (logged)	0.665					95% Critical H Value (KM-Log)	2.079
638					KM Standard Error of Mean (logged)	0.118					95% H-UCL (KM -Log)	7.124
639					KM SD (logged)	0.665					95% Critical H Value (KM-Log)	2.079
640					KM Standard Error of Mean (logged)	0.118						
641												
642	<b>DL/2 Statistics</b>											
643	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
644					Mean in Original Scale	6.165					Mean in Log Scale	1.484
645					SD in Original Scale	8.166					SD in Log Scale	0.696
646					95% t UCL (Assumes normality)	8.573					95% H-Stat UCL	7.286
647	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
648												
649	<b>Nonparametric Distribution Free UCL Statistics</b>											
650	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
651												
652	<b>Suggested UCL to Use</b>											
653					95% KM (Chebyshev) UCL	12.38						
654												
655	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
656	Recommendations are based upon data size, data distribution, and skewness.											
657	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
658	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
659												
660												
661	<b>Copper</b>											
662												
663	<b>General Statistics</b>											
664					Total Number of Observations	49					Number of Distinct Observations	48
665											Number of Missing Observations	0
666					Minimum	5.3					Mean	160.6
667					Maximum	1660					Median	30.3
668					SD	306.5					Std. Error of Mean	43.79
669					Coefficient of Variation	1.909					Skewness	3.419
670												
671	<b>Normal GOF Test</b>											
672					Shapiro Wilk Test Statistic	0.552					<b>Shapiro Wilk GOF Test</b>	
673					5% Shapiro Wilk Critical Value	0.947					Data Not Normal at 5% Significance Level	
674					Lilliefors Test Statistic	0.306					<b>Lilliefors GOF Test</b>	
675					5% Lilliefors Critical Value	0.126					Data Not Normal at 5% Significance Level	
676	<b>Data Not Normal at 5% Significance Level</b>											
677												
678	<b>Assuming Normal Distribution</b>											
679	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
680					95% Student's-t UCL	234					95% Adjusted-CLT UCL (Chen-1995)	255.4
681											95% Modified-t UCL (Johnson-1978)	237.6
682												
683	<b>Gamma GOF Test</b>											
684					A-D Test Statistic	2.345					<b>Anderson-Darling Gamma GOF Test</b>	
685					5% A-D Critical Value	0.812					Data Not Gamma Distributed at 5% Significance Level	
686					K-S Test Statistic	0.187					<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
687					5% K-S Critical Value	0.134					Data Not Gamma Distributed at 5% Significance Level	
688	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
689												

	A	B	C	D	E	F	G	H	I	J	K	L	
690	<b>Gamma Statistics</b>												
691	k hat (MLE)				0.526	k star (bias corrected MLE)				0.507			
692	Theta hat (MLE)				305.3	Theta star (bias corrected MLE)				316.5			
693	nu hat (MLE)				51.54	nu star (bias corrected)				49.72			
694	MLE Mean (bias corrected)				160.6	MLE Sd (bias corrected)				225.4			
695					Approximate Chi Square Value (0.05)				34.53				
696	Adjusted Level of Significance				0.0451	Adjusted Chi Square Value				34.14			
697													
698	<b>Assuming Gamma Distribution</b>												
699	95% Approximate Gamma UCL (use when n>=50))				231.2	95% Adjusted Gamma UCL (use when n<50)				233.8			
700													
701	<b>Lognormal GOF Test</b>												
702	Shapiro Wilk Test Statistic				0.927	<b>Shapiro Wilk Lognormal GOF Test</b>							
703	5% Shapiro Wilk Critical Value				0.947	Data Not Lognormal at 5% Significance Level							
704	Lilliefors Test Statistic				0.151	<b>Lilliefors Lognormal GOF Test</b>							
705	5% Lilliefors Critical Value				0.126	Data Not Lognormal at 5% Significance Level							
706	<b>Data Not Lognormal at 5% Significance Level</b>												
707													
708	<b>Lognormal Statistics</b>												
709	Minimum of Logged Data				1.668	Mean of logged Data				3.88			
710	Maximum of Logged Data				7.415	SD of logged Data				1.546			
711													
712	<b>Assuming Lognormal Distribution</b>												
713	95% H-UCL				311.9	90% Chebyshev (MVUE) UCL				286.9			
714	95% Chebyshev (MVUE) UCL				348	97.5% Chebyshev (MVUE) UCL				432.8			
715	99% Chebyshev (MVUE) UCL				599.3								
716													
717	<b>Nonparametric Distribution Free UCL Statistics</b>												
718	<b>Data do not follow a Discernible Distribution (0.05)</b>												
719													
720	<b>Nonparametric Distribution Free UCLs</b>												
721	95% CLT UCL				232.6	95% Jackknife UCL				234			
722	95% Standard Bootstrap UCL				232.3	95% Bootstrap-t UCL				277.9			
723	95% Hall's Bootstrap UCL				366	95% Percentile Bootstrap UCL				236.2			
724	95% BCA Bootstrap UCL				258.1								
725	90% Chebyshev(Mean, Sd) UCL				291.9	95% Chebyshev(Mean, Sd) UCL				351.4			
726	97.5% Chebyshev(Mean, Sd) UCL				434	99% Chebyshev(Mean, Sd) UCL				596.3			
727													
728	<b>Suggested UCL to Use</b>												
729	95% Chebyshev (Mean, Sd) UCL				351.4								
730													
731	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
732	Recommendations are based upon data size, data distribution, and skewness.												
733	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
734	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
735													
736													
737	<b>Lead</b>												
738													
739	<b>General Statistics</b>												
740	Total Number of Observations				54	Number of Distinct Observations				54			
741						Number of Missing Observations				0			
742	Minimum				6.1	Mean				336			

	A	B	C	D	E	F	G	H	I	J	K	L
743					Maximum	5530					Median	96
744					SD	797.5					Std. Error of Mean	108.5
745					Coefficient of Variation	2.373					Skewness	5.501
746												
747	<b>Normal GOF Test</b>											
748					Shapiro Wilk Test Statistic	0.428					<b>Shapiro Wilk GOF Test</b>	
749					5% Shapiro Wilk P Value	0					Data Not Normal at 5% Significance Level	
750					Lilliefors Test Statistic	0.34					<b>Lilliefors GOF Test</b>	
751					5% Lilliefors Critical Value	0.12					Data Not Normal at 5% Significance Level	
752	<b>Data Not Normal at 5% Significance Level</b>											
753												
754	<b>Assuming Normal Distribution</b>											
755	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
756					95% Student's-t UCL	517.7					95% Adjusted-CLT UCL (Chen-1995)	601.3
757											95% Modified-t UCL (Johnson-1978)	531.2
758												
759	<b>Gamma GOF Test</b>											
760					A-D Test Statistic	1.903					<b>Anderson-Darling Gamma GOF Test</b>	
761					5% A-D Critical Value	0.823					Data Not Gamma Distributed at 5% Significance Level	
762					K-S Test Statistic	0.153					<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
763					5% K-S Critical Value	0.129					Data Not Gamma Distributed at 5% Significance Level	
764	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
765												
766	<b>Gamma Statistics</b>											
767					k hat (MLE)	0.467					k star (bias corrected MLE)	0.454
768					Theta hat (MLE)	719					Theta star (bias corrected MLE)	740.6
769					nu hat (MLE)	50.47					nu star (bias corrected)	49
770					MLE Mean (bias corrected)	336					MLE Sd (bias corrected)	498.8
771											Approximate Chi Square Value (0.05)	33.93
772					Adjusted Level of Significance	0.0456					Adjusted Chi Square Value	33.59
773												
774	<b>Assuming Gamma Distribution</b>											
775					95% Approximate Gamma UCL (use when n>=50))	485.2					95% Adjusted Gamma UCL (use when n<50)	490.2
776												
777	<b>Lognormal GOF Test</b>											
778					Shapiro Wilk Test Statistic	0.945					<b>Shapiro Wilk Lognormal GOF Test</b>	
779					5% Shapiro Wilk P Value	0.0247					Data Not Lognormal at 5% Significance Level	
780					Lilliefors Test Statistic	0.133					<b>Lilliefors Lognormal GOF Test</b>	
781					5% Lilliefors Critical Value	0.12					Data Not Lognormal at 5% Significance Level	
782	<b>Data Not Lognormal at 5% Significance Level</b>											
783												
784	<b>Lognormal Statistics</b>											
785					Minimum of Logged Data	1.808					Mean of logged Data	4.444
786					Maximum of Logged Data	8.618					SD of logged Data	1.703
787												
788	<b>Assuming Lognormal Distribution</b>											
789					95% H-UCL	775.9					90% Chebyshev (MVUE) UCL	672.5
790					95% Chebyshev (MVUE) UCL	822.5					97.5% Chebyshev (MVUE) UCL	1031
791					99% Chebyshev (MVUE) UCL	1440						
792												
793	<b>Nonparametric Distribution Free UCL Statistics</b>											
794	<b>Data do not follow a Discernible Distribution (0.05)</b>											
795												

	A	B	C	D	E	F	G	H	I	J	K	L	
796	<b>Nonparametric Distribution Free UCLs</b>												
797	95% CLT UCL				514.5	95% Jackknife UCL				517.7			
798	95% Standard Bootstrap UCL				511.7	95% Bootstrap-t UCL				754			
799	95% Hall's Bootstrap UCL				1194	95% Percentile Bootstrap UCL				536.4			
800	95% BCA Bootstrap UCL				651.9								
801	90% Chebyshev(Mean, Sd) UCL				661.6	95% Chebyshev(Mean, Sd) UCL				809.1			
802	97.5% Chebyshev(Mean, Sd) UCL				1014	99% Chebyshev(Mean, Sd) UCL				1416			
803													
804	<b>Suggested UCL to Use</b>												
805	95% Chebyshev (Mean, Sd) UCL				809.1								
806													
807	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
808	Recommendations are based upon data size, data distribution, and skewness.												
809	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
810	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
811													
812													
813	<b>Manganese</b>												
814													
815	<b>General Statistics</b>												
816	Total Number of Observations				52	Number of Distinct Observations				52			
817						Number of Missing Observations				0			
818	Minimum				5.4	Mean				629.2			
819	Maximum				3350	Median				351.5			
820	SD				704.3	Std. Error of Mean				97.67			
821	Coefficient of Variation				1.119	Skewness				2.588			
822													
823	<b>Normal GOF Test</b>												
824	Shapiro Wilk Test Statistic				0.66	<b>Shapiro Wilk GOF Test</b>							
825	5% Shapiro Wilk P Value				1.232E-14	Data Not Normal at 5% Significance Level							
826	Lilliefors Test Statistic				0.261	<b>Lilliefors GOF Test</b>							
827	5% Lilliefors Critical Value				0.122	Data Not Normal at 5% Significance Level							
828	<b>Data Not Normal at 5% Significance Level</b>												
829													
830	<b>Assuming Normal Distribution</b>												
831	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>							
832	95% Student's-t UCL				792.8	95% Adjusted-CLT UCL (Chen-1995)				827.3			
833						95% Modified-t UCL (Johnson-1978)				798.6			
834													
835	<b>Gamma GOF Test</b>												
836	A-D Test Statistic				2.269	<b>Anderson-Darling Gamma GOF Test</b>							
837	5% A-D Critical Value				0.772	Data Not Gamma Distributed at 5% Significance Level							
838	K-S Test Statistic				0.183	<b>Kolmogorov-Smirnov Gamma GOF Test</b>							
839	5% K-S Critical Value				0.126	Data Not Gamma Distributed at 5% Significance Level							
840	<b>Data Not Gamma Distributed at 5% Significance Level</b>												
841													
842	<b>Gamma Statistics</b>												
843	k hat (MLE)				1.31	k star (bias corrected MLE)				1.247			
844	Theta hat (MLE)				480.4	Theta star (bias corrected MLE)				504.6			
845	nu hat (MLE)				136.2	nu star (bias corrected)				129.7			
846	MLE Mean (bias corrected)				629.2	MLE Sd (bias corrected)				563.4			
847						Approximate Chi Square Value (0.05)				104.4			
848	Adjusted Level of Significance				0.0454	Adjusted Chi Square Value				103.7			



	A	B	C	D	E	F	G	H	I	J	K	L
849												
850	<b>Assuming Gamma Distribution</b>											
851	95% Approximate Gamma UCL (use when n>=50))					781.7	95% Adjusted Gamma UCL (use when n<50)					786.6
852												
853	<b>Lognormal GOF Test</b>											
854	Shapiro Wilk Test Statistic					0.883	<b>Shapiro Wilk Lognormal GOF Test</b>					
855	5% Shapiro Wilk P Value					2.6800E-5	Data Not Lognormal at 5% Significance Level					
856	Lilliefors Test Statistic					0.134	<b>Lilliefors Lognormal GOF Test</b>					
857	5% Lilliefors Critical Value					0.122	Data Not Lognormal at 5% Significance Level					
858	<b>Data Not Lognormal at 5% Significance Level</b>											
859												
860	<b>Lognormal Statistics</b>											
861	Minimum of Logged Data					1.686	Mean of logged Data					6.016
862	Maximum of Logged Data					8.117	SD of logged Data					0.988
863												
864	<b>Assuming Lognormal Distribution</b>											
865	95% H-UCL					918.3	90% Chebyshev (MVUE) UCL					977.2
866	95% Chebyshev (MVUE) UCL					1121	97.5% Chebyshev (MVUE) UCL					1321
867	99% Chebyshev (MVUE) UCL					1714						
868												
869	<b>Nonparametric Distribution Free UCL Statistics</b>											
870	<b>Data do not follow a Discernible Distribution (0.05)</b>											
871												
872	<b>Nonparametric Distribution Free UCLs</b>											
873	95% CLT UCL					789.8	95% Jackknife UCL					792.8
874	95% Standard Bootstrap UCL					788.9	95% Bootstrap-t UCL					869.5
875	95% Hall's Bootstrap UCL					846.4	95% Percentile Bootstrap UCL					791.7
876	95% BCA Bootstrap UCL					815.8						
877	90% Chebyshev(Mean, Sd) UCL					922.2	95% Chebyshev(Mean, Sd) UCL					1055
878	97.5% Chebyshev(Mean, Sd) UCL					1239	99% Chebyshev(Mean, Sd) UCL					1601
879												
880	<b>Suggested UCL to Use</b>											
881	95% Chebyshev (Mean, Sd) UCL					1055						
882												
883	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
884	Recommendations are based upon data size, data distribution, and skewness.											
885	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
886	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
887												
888												
889	<b>Mercury</b>											
890												
891	<b>General Statistics</b>											
892	Total Number of Observations					41	Number of Distinct Observations					36
893							Number of Missing Observations					0
894	Minimum					0.018	Mean					0.324
895	Maximum					2	Median					0.184
896	SD					0.404	Std. Error of Mean					0.0632
897	Coefficient of Variation					1.247	Skewness					2.364
898												
899	<b>Normal GOF Test</b>											
900	Shapiro Wilk Test Statistic					0.71	<b>Shapiro Wilk GOF Test</b>					
901	5% Shapiro Wilk Critical Value					0.941	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
902	Lilliefors Test Statistic					0.269	Lilliefors GOF Test					
903	5% Lilliefors Critical Value					0.137	Data Not Normal at 5% Significance Level					
904	Data Not Normal at 5% Significance Level											
905												
906	Assuming Normal Distribution											
907	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
908	95% Student's-t UCL					0.431	95% Adjusted-CLT UCL (Chen-1995)					0.453
909							95% Modified-t UCL (Johnson-1978)					0.435
910												
911	Gamma GOF Test											
912	A-D Test Statistic					0.834	Anderson-Darling Gamma GOF Test					
913	5% A-D Critical Value					0.783	Data Not Gamma Distributed at 5% Significance Level					
914	K-S Test Statistic					0.131	Kolmogorov-Smirnov Gamma GOF Test					
915	5% K-S Critical Value					0.143	Detected data appear Gamma Distributed at 5% Significance Level					
916	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
917												
918	Gamma Statistics											
919	k hat (MLE)					0.889	k star (bias corrected MLE)					0.84
920	Theta hat (MLE)					0.365	Theta star (bias corrected MLE)					0.386
921	nu hat (MLE)					72.88	nu star (bias corrected)					68.88
922	MLE Mean (bias corrected)					0.324	MLE Sd (bias corrected)					0.354
923							Approximate Chi Square Value (0.05)					50.78
924	Adjusted Level of Significance					0.0441	Adjusted Chi Square Value					50.21
925												
926	Assuming Gamma Distribution											
927	95% Approximate Gamma UCL (use when n>=50)					0.44	95% Adjusted Gamma UCL (use when n<50)					0.445
928												
929	Lognormal GOF Test											
930	Shapiro Wilk Test Statistic					0.953	Shapiro Wilk Lognormal GOF Test					
931	5% Shapiro Wilk Critical Value					0.941	Data appear Lognormal at 5% Significance Level					
932	Lilliefors Test Statistic					0.108	Lilliefors Lognormal GOF Test					
933	5% Lilliefors Critical Value					0.137	Data appear Lognormal at 5% Significance Level					
934	Data appear Lognormal at 5% Significance Level											
935												
936	Lognormal Statistics											
937	Minimum of Logged Data					-4.017	Mean of logged Data					-1.784
938	Maximum of Logged Data					0.693	SD of logged Data					1.228
939												
940	Assuming Lognormal Distribution											
941	95% H-UCL					0.593	90% Chebyshev (MVUE) UCL					0.591
942	95% Chebyshev (MVUE) UCL					0.702	97.5% Chebyshev (MVUE) UCL					0.857
943	99% Chebyshev (MVUE) UCL					1.159						
944												
945	Nonparametric Distribution Free UCL Statistics											
946	Data appear to follow a Discernible Distribution at 5% Significance Level											
947												
948	Nonparametric Distribution Free UCLs											
949	95% CLT UCL					0.428	95% Jackknife UCL					0.431
950	95% Standard Bootstrap UCL					0.428	95% Bootstrap-t UCL					0.473
951	95% Hall's Bootstrap UCL					0.472	95% Percentile Bootstrap UCL					0.435
952	95% BCA Bootstrap UCL					0.467						
953	90% Chebyshev(Mean, Sd) UCL					0.514	95% Chebyshev(Mean, Sd) UCL					0.6
954	97.5% Chebyshev(Mean, Sd) UCL					0.719	99% Chebyshev(Mean, Sd) UCL					0.953

	A	B	C	D	E	F	G	H	I	J	K	L
955												
956	<b>Suggested UCL to Use</b>											
957	95% Adjusted Gamma UCL					0.445						
958												
959	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
960	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
961												
962	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
963	Recommendations are based upon data size, data distribution, and skewness.											
964	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
965	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
966												
967	<b>Thallium</b>											
968												
969	<b>General Statistics</b>											
970	Total Number of Observations				26		Number of Distinct Observations				15	
971	Number of Detects				11		Number of Non-Detects				15	
972	Number of Distinct Detects				10		Number of Distinct Non-Detects				6	
973	Minimum Detect				0.7		Minimum Non-Detect				1	
974	Maximum Detect				4.2		Maximum Non-Detect				13	
975	Variance Detects				1.057		Percent Non-Detects				57.69%	
976	Mean Detects				1.705		SD Detects				1.028	
977	Median Detects				1.4		CV Detects				0.603	
978	Skewness Detects				1.571		Kurtosis Detects				2.7	
979	Mean of Logged Detects				0.392		SD of Logged Detects				0.542	
980												
981	<b>Normal GOF Test on Detects Only</b>											
982	Shapiro Wilk Test Statistic				0.852		<b>Shapiro Wilk GOF Test</b>					
983	5% Shapiro Wilk Critical Value				0.85		Detected Data appear Normal at 5% Significance Level					
984	Lilliefors Test Statistic				0.215		<b>Lilliefors GOF Test</b>					
985	5% Lilliefors Critical Value				0.251		Detected Data appear Normal at 5% Significance Level					
986	<b>Detected Data appear Normal at 5% Significance Level</b>											
987												
988	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
989	KM Mean				1.243		KM Standard Error of Mean				0.181	
990	KM SD				0.814		95% KM (BCA) UCL				1.612	
991	95% KM (t) UCL				1.552		95% KM (Percentile Bootstrap) UCL				1.574	
992	95% KM (z) UCL				1.54		95% KM Bootstrap t UCL				1.717	
993	90% KM Chebyshev UCL				1.785		95% KM Chebyshev UCL				2.031	
994	97.5% KM Chebyshev UCL				2.372		99% KM Chebyshev UCL				3.042	
995												
996	<b>Gamma GOF Tests on Detected Observations Only</b>											
997	A-D Test Statistic				0.286		<b>Anderson-Darling GOF Test</b>					
998	5% A-D Critical Value				0.733		Detected data appear Gamma Distributed at 5% Significance Level					
999	K-S Test Statistic				0.162		<b>Kolmogorov-Smirnov GOF</b>					
1000	5% K-S Critical Value				0.257		Detected data appear Gamma Distributed at 5% Significance Level					
1001	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1002												
1003	<b>Gamma Statistics on Detected Data Only</b>											
1004	k hat (MLE)				3.706		k star (bias corrected MLE)				2.756	
1005	Theta hat (MLE)				0.46		Theta star (bias corrected MLE)				0.619	
1006	nu hat (MLE)				81.52		nu star (bias corrected)				60.62	
1007	Mean (detects)				1.705							

	A	B	C	D	E	F	G	H	I	J	K	L
1008												
1009	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1010	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1011	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1012	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1013	This is especially true when the sample size is small.											
1014	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1015		Minimum	0.01		Mean	1.084						
1016		Maximum	4.2		Median	0.944						
1017		SD	0.894		CV	0.825						
1018		k hat (MLE)	1.354		k star (bias corrected MLE)	1.224						
1019		Theta hat (MLE)	0.801		Theta star (bias corrected MLE)	0.886						
1020		nu hat (MLE)	70.42		nu star (bias corrected)	63.63						
1021		Adjusted Level of Significance ( $\beta$ )	0.0398									
1022		Approximate Chi Square Value (63.63, $\alpha$ )	46.28		Adjusted Chi Square Value (63.63, $\beta$ )	45.3						
1023		95% Gamma Approximate UCL (use when $n \geq 50$ )	1.491		95% Gamma Adjusted UCL (use when $n < 50$ )	1.523						
1024												
1025	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1026		Mean (KM)	1.243		SD (KM)	0.814						
1027		Variance (KM)	0.663		SE of Mean (KM)	0.181						
1028		k hat (KM)	2.331		k star (KM)	2.087						
1029		nu hat (KM)	121.2		nu star (KM)	108.5						
1030		theta hat (KM)	0.533		theta star (KM)	0.595						
1031		80% gamma percentile (KM)	1.851		90% gamma percentile (KM)	2.393						
1032		95% gamma percentile (KM)	2.908		99% gamma percentile (KM)	4.049						
1033												
1034	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1035		Approximate Chi Square Value (108.55, $\alpha$ )	85.5		Adjusted Chi Square Value (108.55, $\beta$ )	84.15						
1036		95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	1.578		95% Gamma Adjusted KM-UCL (use when $n < 50$ )	1.603						
1037												
1038	<b>Lognormal GOF Test on Detected Observations Only</b>											
1039		Shapiro Wilk Test Statistic	0.968		<b>Shapiro Wilk GOF Test</b>							
1040		5% Shapiro Wilk Critical Value	0.85		Detected Data appear Lognormal at 5% Significance Level							
1041		Lilliefors Test Statistic	0.129		<b>Lilliefors GOF Test</b>							
1042		5% Lilliefors Critical Value	0.251		Detected Data appear Lognormal at 5% Significance Level							
1043	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1044												
1045	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1046		Mean in Original Scale	1.201		Mean in Log Scale	0.0353						
1047		SD in Original Scale	0.805		SD in Log Scale	0.518						
1048		95% t UCL (assumes normality of ROS data)	1.471		95% Percentile Bootstrap UCL	1.482						
1049		95% BCA Bootstrap UCL	1.562		95% Bootstrap t UCL	1.624						
1050		95% H-UCL (Log ROS)	1.455									
1051												
1052	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1053		KM Mean (logged)	0.0784		KM Geo Mean	1.082						
1054		KM SD (logged)	0.478		95% Critical H Value (KM-Log)	1.947						
1055		KM Standard Error of Mean (logged)	0.111		95% H-UCL (KM -Log)	1.461						
1056		KM SD (logged)	0.478		95% Critical H Value (KM-Log)	1.947						
1057		KM Standard Error of Mean (logged)	0.111									
1058												
1059	<b>DL/2 Statistics</b>											
1060	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
1061	Mean in Original Scale				1.629	Mean in Log Scale				0.0889		
1062	SD in Original Scale				1.728	SD in Log Scale				0.843		
1063	95% t UCL (Assumes normality)				2.208	95% H-Stat UCL				2.304		
1064	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1065												
1066	<b>Nonparametric Distribution Free UCL Statistics</b>											
1067	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>											
1068												
1069	<b>Suggested UCL to Use</b>											
1070	95% KM (t) UCL				1.552							
1071												
1072	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1073	Recommendations are based upon data size, data distribution, and skewness.											
1074	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1075	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1076												
1077												
1078	<b>Zinc</b>											
1079												
1080	<b>General Statistics</b>											
1081	Total Number of Observations				54	Number of Distinct Observations				51		
1082						Number of Missing Observations				0		
1083	Minimum				10	Mean				499.9		
1084	Maximum				4230	Median				127		
1085	SD				991.5	Std. Error of Mean				134.9		
1086	Coefficient of Variation				1.984	Skewness				2.757		
1087												
1088	<b>Normal GOF Test</b>											
1089	Shapiro Wilk Test Statistic				0.506	<b>Shapiro Wilk GOF Test</b>						
1090	5% Shapiro Wilk P Value				0	Data Not Normal at 5% Significance Level						
1091	Lilliefors Test Statistic				0.371	<b>Lilliefors GOF Test</b>						
1092	5% Lilliefors Critical Value				0.12	Data Not Normal at 5% Significance Level						
1093	<b>Data Not Normal at 5% Significance Level</b>											
1094												
1095	<b>Assuming Normal Distribution</b>											
1096	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>						
1097	95% Student's-t UCL				725.7	95% Adjusted-CLT UCL (Chen-1995)				775.9		
1098						95% Modified-t UCL (Johnson-1978)				734.2		
1099												
1100	<b>Gamma GOF Test</b>											
1101	A-D Test Statistic				4.029	<b>Anderson-Darling Gamma GOF Test</b>						
1102	5% A-D Critical Value				0.812	Data Not Gamma Distributed at 5% Significance Level						
1103	K-S Test Statistic				0.209	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
1104	5% K-S Critical Value				0.128	Data Not Gamma Distributed at 5% Significance Level						
1105	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
1106												
1107	<b>Gamma Statistics</b>											
1108	k hat (MLE)				0.536	k star (bias corrected MLE)				0.518		
1109	Theta hat (MLE)				933.4	Theta star (bias corrected MLE)				964.8		
1110	nu hat (MLE)				57.84	nu star (bias corrected)				55.96		
1111	MLE Mean (bias corrected)				499.9	MLE Sd (bias corrected)				694.4		
1112						Approximate Chi Square Value (0.05)				39.76		
1113	Adjusted Level of Significance				0.0456	Adjusted Chi Square Value				39.39		

	A	B	C	D	E	F	G	H	I	J	K	L
1114												
1115	<b>Assuming Gamma Distribution</b>											
1116	95% Approximate Gamma UCL (use when n>=50))					703.4	95% Adjusted Gamma UCL (use when n<50)					710.1
1117												
1118	<b>Lognormal GOF Test</b>											
1119	Shapiro Wilk Test Statistic					0.926	<b>Shapiro Wilk Lognormal GOF Test</b>					
1120	5% Shapiro Wilk P Value					0.00284	Data Not Lognormal at 5% Significance Level					
1121	Lilliefors Test Statistic					0.137	<b>Lilliefors Lognormal GOF Test</b>					
1122	5% Lilliefors Critical Value					0.12	Data Not Lognormal at 5% Significance Level					
1123	<b>Data Not Lognormal at 5% Significance Level</b>											
1124												
1125	<b>Lognormal Statistics</b>											
1126	Minimum of Logged Data					2.303	Mean of logged Data					5.041
1127	Maximum of Logged Data					8.35	SD of logged Data					1.435
1128												
1129	<b>Assuming Lognormal Distribution</b>											
1130	95% H-UCL					767.8	90% Chebyshev (MVUE) UCL					738.8
1131	95% Chebyshev (MVUE) UCL					884.5	97.5% Chebyshev (MVUE) UCL					1087
1132	99% Chebyshev (MVUE) UCL					1484						
1133												
1134	<b>Nonparametric Distribution Free UCL Statistics</b>											
1135	<b>Data do not follow a Discernible Distribution (0.05)</b>											
1136												
1137	<b>Nonparametric Distribution Free UCLs</b>											
1138	95% CLT UCL					721.8	95% Jackknife UCL					725.7
1139	95% Standard Bootstrap UCL					717.1	95% Bootstrap-t UCL					799.6
1140	95% Hall's Bootstrap UCL					722.6	95% Percentile Bootstrap UCL					723.6
1141	95% BCA Bootstrap UCL					781.2						
1142	90% Chebyshev(Mean, Sd) UCL					904.6	95% Chebyshev(Mean, Sd) UCL					1088
1143	97.5% Chebyshev(Mean, Sd) UCL					1342	99% Chebyshev(Mean, Sd) UCL					1842
1144												
1145	<b>Suggested UCL to Use</b>											
1146	95% Chebyshev (Mean, Sd) UCL					1088						
1147												
1148	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1149	Recommendations are based upon data size, data distribution, and skewness.											
1150	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1151	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1152												
1153	<b>Benzo(a)anthracene</b>											
1154												
1155	<b>General Statistics</b>											
1156	Total Number of Observations					58	Number of Distinct Observations					45
1157	Number of Detects					50	Number of Non-Detects					8
1158	Number of Distinct Detects					41	Number of Distinct Non-Detects					6
1159	Minimum Detect					0.038	Minimum Non-Detect					0.35
1160	Maximum Detect					3.3	Maximum Non-Detect					0.51
1161	Variance Detects					0.602	Percent Non-Detects					13.79%
1162	Mean Detects					0.716	SD Detects					0.776
1163	Median Detects					0.49	CV Detects					1.084
1164	Skewness Detects					1.89	Kurtosis Detects					3.288
1165	Mean of Logged Detects					-0.911	SD of Logged Detects					1.188
1166												

	A	B	C	D	E	F	G	H	I	J	K	L
1167	<b>Normal GOF Test on Detects Only</b>											
1168	Shapiro Wilk Test Statistic					0.763	<b>Shapiro Wilk GOF Test</b>					
1169	5% Shapiro Wilk Critical Value					0.947	Detected Data Not Normal at 5% Significance Level					
1170	Lilliefors Test Statistic					0.262	<b>Lilliefors GOF Test</b>					
1171	5% Lilliefors Critical Value					0.125	Detected Data Not Normal at 5% Significance Level					
1172	<b>Detected Data Not Normal at 5% Significance Level</b>											
1173												
1174	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1175	KM Mean					0.638	KM Standard Error of Mean					0.0984
1176	KM SD					0.74	95% KM (BCA) UCL					0.82
1177	95% KM (t) UCL					0.802	95% KM (Percentile Bootstrap) UCL					0.805
1178	95% KM (z) UCL					0.8	95% KM Bootstrap t UCL					0.847
1179	90% KM Chebyshev UCL					0.933	95% KM Chebyshev UCL					1.067
1180	97.5% KM Chebyshev UCL					1.252	99% KM Chebyshev UCL					1.617
1181												
1182	<b>Gamma GOF Tests on Detected Observations Only</b>											
1183	A-D Test Statistic					0.548	<b>Anderson-Darling GOF Test</b>					
1184	5% A-D Critical Value					0.78	Detected data appear Gamma Distributed at 5% Significance Level					
1185	K-S Test Statistic					0.132	<b>Kolmogorov-Smirnov GOF</b>					
1186	5% K-S Critical Value					0.129	Detected Data Not Gamma Distributed at 5% Significance Level					
1187	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1188												
1189	<b>Gamma Statistics on Detected Data Only</b>											
1190	k hat (MLE)					1.001	k star (bias corrected MLE)					0.954
1191	Theta hat (MLE)					0.716	Theta star (bias corrected MLE)					0.751
1192	nu hat (MLE)					100.1	nu star (bias corrected)					95.39
1193	Mean (detects)					0.716						
1194												
1195	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1196	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1197	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1198	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1199	This is especially true when the sample size is small.											
1200	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1201	Minimum					0.01	Mean					0.626
1202	Maximum					3.3	Median					0.41
1203	SD					0.755	CV					1.206
1204	k hat (MLE)					0.799	k star (bias corrected MLE)					0.769
1205	Theta hat (MLE)					0.783	Theta star (bias corrected MLE)					0.814
1206	nu hat (MLE)					92.65	nu star (bias corrected)					89.19
1207	Adjusted Level of Significance ( $\beta$ )					0.0459						
1208	Approximate Chi Square Value (89.19, $\alpha$ )					68.42	Adjusted Chi Square Value (89.19, $\beta$ )					67.95
1209	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.816	95% Gamma Adjusted UCL (use when $n < 50$ )					0.821
1210												
1211	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1212	Mean (KM)					0.638	SD (KM)					0.74
1213	Variance (KM)					0.548	SE of Mean (KM)					0.0984
1214	k hat (KM)					0.742	k star (KM)					0.715
1215	nu hat (KM)					86.04	nu star (KM)					82.92
1216	theta hat (KM)					0.86	theta star (KM)					0.892
1217	80% gamma percentile (KM)					1.048	90% gamma percentile (KM)					1.593
1218	95% gamma percentile (KM)					2.154	99% gamma percentile (KM)					3.492
1219												

	A	B	C	D	E	F	G	H	I	J	K	L
1220	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1221	Approximate Chi Square Value (82.92, $\alpha$ )					62.94	Adjusted Chi Square Value (82.92, $\beta$ )					62.49
1222	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.84	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.846
1223												
1224	<b>Lognormal GOF Test on Detected Observations Only</b>											
1225	Shapiro Wilk Test Statistic					0.945	<b>Shapiro Wilk GOF Test</b>					
1226	5% Shapiro Wilk Critical Value					0.947	Detected Data Not Lognormal at 5% Significance Level					
1227	Lilliefors Test Statistic					0.123	<b>Lilliefors GOF Test</b>					
1228	5% Lilliefors Critical Value					0.125	Detected Data appear Lognormal at 5% Significance Level					
1229	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>											
1230												
1231	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1232	Mean in Original Scale					0.636	Mean in Log Scale					-1.065
1233	SD in Original Scale					0.747	SD in Log Scale					1.172
1234	95% t UCL (assumes normality of ROS data)					0.8	95% Percentile Bootstrap UCL					0.799
1235	95% BCA Bootstrap UCL					0.823	95% Bootstrap t UCL					0.833
1236	95% H-UCL (Log ROS)					1.031						
1237												
1238	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1239	KM Mean (logged)					-1.085	KM Geo Mean					0.338
1240	KM SD (logged)					1.208	95% Critical H Value (KM-Log)					2.702
1241	KM Standard Error of Mean (logged)					0.166	95% H-UCL (KM -Log)					1.08
1242	KM SD (logged)					1.208	95% Critical H Value (KM-Log)					2.702
1243	KM Standard Error of Mean (logged)					0.166						
1244												
1245	<b>DL/2 Statistics</b>											
1246	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1247	Mean in Original Scale					0.644	Mean in Log Scale					-1.014
1248	SD in Original Scale					0.742	SD in Log Scale					1.132
1249	95% t UCL (Assumes normality)					0.807	95% H-Stat UCL					1.011
1250	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1251												
1252	<b>Nonparametric Distribution Free UCL Statistics</b>											
1253	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											
1254												
1255	<b>Suggested UCL to Use</b>											
1256	95% KM Approximate Gamma UCL					0.84						
1257												
1258	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1259	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1260												
1261	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1262	Recommendations are based upon data size, data distribution, and skewness.											
1263	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1264	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1265												
1266	<b>Benzo(b)fluoranthene</b>											
1267												
1268	<b>General Statistics</b>											
1269	Total Number of Observations					57	Number of Distinct Observations					41
1270	Number of Detects					50	Number of Non-Detects					7
1271	Number of Distinct Detects					40	Number of Distinct Non-Detects					5
1272	Minimum Detect					0.044	Minimum Non-Detect					0.35



	A	B	C	D	E	F	G	H	I	J	K	L
1273				Maximum Detect	3.6					Maximum Non-Detect	0.51	
1274				Variance Detects	0.781					Percent Non-Detects	12.28%	
1275				Mean Detects	0.831					SD Detects	0.884	
1276				Median Detects	0.475					CV Detects	1.063	
1277				Skewness Detects	1.77					Kurtosis Detects	2.83	
1278				Mean of Logged Detects	-0.738					SD of Logged Detects	1.144	
1279												
1280	<b>Normal GOF Test on Detects Only</b>											
1281				Shapiro Wilk Test Statistic	0.777					<b>Shapiro Wilk GOF Test</b>		
1282				5% Shapiro Wilk Critical Value	0.947					Detected Data Not Normal at 5% Significance Level		
1283				Lilliefors Test Statistic	0.219					<b>Lilliefors GOF Test</b>		
1284				5% Lilliefors Critical Value	0.125					Detected Data Not Normal at 5% Significance Level		
1285	<b>Detected Data Not Normal at 5% Significance Level</b>											
1286												
1287	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1288				KM Mean	0.753					KM Standard Error of Mean	0.113	
1289				KM SD	0.846					95% KM (BCA) UCL	0.937	
1290				95% KM (t) UCL	0.943					95% KM (Percentile Bootstrap) UCL	0.946	
1291				95% KM (z) UCL	0.94					95% KM Bootstrap t UCL	0.985	
1292				90% KM Chebyshev UCL	1.094					95% KM Chebyshev UCL	1.248	
1293				97.5% KM Chebyshev UCL	1.462					99% KM Chebyshev UCL	1.882	
1294												
1295	<b>Gamma GOF Tests on Detected Observations Only</b>											
1296				A-D Test Statistic	0.473					<b>Anderson-Darling GOF Test</b>		
1297				5% A-D Critical Value	0.779					Detected data appear Gamma Distributed at 5% Significance Level		
1298				K-S Test Statistic	0.105					<b>Kolmogorov-Smirnov GOF</b>		
1299				5% K-S Critical Value	0.129					Detected data appear Gamma Distributed at 5% Significance Level		
1300	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1301												
1302	<b>Gamma Statistics on Detected Data Only</b>											
1303				k hat (MLE)	1.039					k star (bias corrected MLE)	0.99	
1304				Theta hat (MLE)	0.8					Theta star (bias corrected MLE)	0.84	
1305				nu hat (MLE)	103.9					nu star (bias corrected)	99.01	
1306				Mean (detects)	0.831							
1307												
1308	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1309	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1310	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1311	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1312	This is especially true when the sample size is small.											
1313	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1314				Minimum	0.01					Mean	0.74	
1315				Maximum	3.6					Median	0.4	
1316				SD	0.863					CV	1.165	
1317				k hat (MLE)	0.867					k star (bias corrected MLE)	0.833	
1318				Theta hat (MLE)	0.854					Theta star (bias corrected MLE)	0.889	
1319				nu hat (MLE)	98.86					nu star (bias corrected)	94.99	
1320				Adjusted Level of Significance ( $\beta$ )	0.0458							
1321				Approximate Chi Square Value (94.99, $\alpha$ )	73.51					Adjusted Chi Square Value (94.99, $\beta$ )	73.02	
1322				95% Gamma Approximate UCL (use when $n \geq 50$ )	0.957					95% Gamma Adjusted UCL (use when $n < 50$ )	0.963	
1323												
1324	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1325				Mean (KM)	0.753					SD (KM)	0.846	

	A	B	C	D	E	F	G	H	I	J	K	L
1326					Variance (KM)	0.717				SE of Mean (KM)		0.113
1327					k hat (KM)	0.792				k star (KM)		0.762
1328					nu hat (KM)	90.31				nu star (KM)		86.89
1329					theta hat (KM)	0.951				theta star (KM)		0.988
1330					80% gamma percentile (KM)	1.234				90% gamma percentile (KM)		1.853
1331					95% gamma percentile (KM)	2.487				99% gamma percentile (KM)		3.989
1332												
1333	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1334	Approximate Chi Square Value (86.89, $\alpha$ )					66.4	Adjusted Chi Square Value (86.89, $\beta$ )					65.94
1335	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.986	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.993
1336												
1337	<b>Lognormal GOF Test on Detected Observations Only</b>											
1338	Shapiro Wilk Test Statistic					0.959	<b>Shapiro Wilk GOF Test</b>					
1339	5% Shapiro Wilk Critical Value					0.947	Detected Data appear Lognormal at 5% Significance Level					
1340	Lilliefors Test Statistic					0.103	<b>Lilliefors GOF Test</b>					
1341	5% Lilliefors Critical Value					0.125	Detected Data appear Lognormal at 5% Significance Level					
1342	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1343												
1344	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1345	Mean in Original Scale					0.751	Mean in Log Scale					-0.866
1346	SD in Original Scale					0.855	SD in Log Scale					1.129
1347	95% t UCL (assumes normality of ROS data)					0.94	95% Percentile Bootstrap UCL					0.943
1348	95% BCA Bootstrap UCL					0.988	95% Bootstrap t UCL					0.986
1349	95% H-UCL (Log ROS)					1.166						
1350												
1351	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1352	KM Mean (logged)					-0.876	KM Geo Mean					0.416
1353	KM SD (logged)					1.153	95% Critical H Value (KM-Log)					2.574
1354	KM Standard Error of Mean (logged)					0.159	95% H-UCL (KM -Log)					1.203
1355	KM SD (logged)					1.153	95% Critical H Value (KM-Log)					2.574
1356	KM Standard Error of Mean (logged)					0.159						
1357												
1358	<b>DL/2 Statistics</b>											
1359	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1360	Mean in Original Scale					0.753	Mean in Log Scale					-0.851
1361	SD in Original Scale					0.853	SD in Log Scale					1.114
1362	95% t UCL (Assumes normality)					0.942	95% H-Stat UCL					1.154
1363	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1364												
1365	<b>Nonparametric Distribution Free UCL Statistics</b>											
1366	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1367												
1368	<b>Suggested UCL to Use</b>											
1369	95% KM Approximate Gamma UCL					0.986						
1370												
1371	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1372	Recommendations are based upon data size, data distribution, and skewness.											
1373	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1374	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1375												
1376	<b>Benzo(k)fluoranthene</b>											
1377												
1378	<b>General Statistics</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1379	Total Number of Observations					55	Number of Distinct Observations					39
1380	Number of Detects					43	Number of Non-Detects					12
1381	Number of Distinct Detects					35	Number of Distinct Non-Detects					7
1382	Minimum Detect					0.049	Minimum Non-Detect					0.35
1383	Maximum Detect					2.5	Maximum Non-Detect					0.51
1384	Variance Detects					0.314	Percent Non-Detects					21.82%
1385	Mean Detects					0.545	SD Detects					0.561
1386	Median Detects					0.38	CV Detects					1.029
1387	Skewness Detects					2.035	Kurtosis Detects					4.066
1388	Mean of Logged Detects					-1.063	SD of Logged Detects					1.015
1389												
1390	<b>Normal GOF Test on Detects Only</b>											
1391	Shapiro Wilk Test Statistic					0.756	<b>Shapiro Wilk GOF Test</b>					
1392	5% Shapiro Wilk Critical Value					0.943	Detected Data Not Normal at 5% Significance Level					
1393	Lilliefors Test Statistic					0.248	<b>Lilliefors GOF Test</b>					
1394	5% Lilliefors Critical Value					0.134	Detected Data Not Normal at 5% Significance Level					
1395	<b>Detected Data Not Normal at 5% Significance Level</b>											
1396												
1397	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1398	KM Mean					0.468	KM Standard Error of Mean					0.0706
1399	KM SD					0.514	95% KM (BCA) UCL					0.583
1400	95% KM (t) UCL					0.587	95% KM (Percentile Bootstrap) UCL					0.592
1401	95% KM (z) UCL					0.584	95% KM Bootstrap t UCL					0.623
1402	90% KM Chebyshev UCL					0.68	95% KM Chebyshev UCL					0.776
1403	97.5% KM Chebyshev UCL					0.909	99% KM Chebyshev UCL					1.171
1404												
1405	<b>Gamma GOF Tests on Detected Observations Only</b>											
1406	A-D Test Statistic					0.653	<b>Anderson-Darling GOF Test</b>					
1407	5% A-D Critical Value					0.773	Detected data appear Gamma Distributed at 5% Significance Level					
1408	K-S Test Statistic					0.129	<b>Kolmogorov-Smirnov GOF</b>					
1409	5% K-S Critical Value					0.138	Detected data appear Gamma Distributed at 5% Significance Level					
1410	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1411												
1412	<b>Gamma Statistics on Detected Data Only</b>											
1413	k hat (MLE)					1.236	k star (bias corrected MLE)					1.165
1414	Theta hat (MLE)					0.441	Theta star (bias corrected MLE)					0.468
1415	nu hat (MLE)					106.3	nu star (bias corrected)					100.2
1416	Mean (detects)					0.545						
1417												
1418	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1419	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1420	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1421	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1422	This is especially true when the sample size is small.											
1423	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1424	Minimum					0.01	Mean					0.451
1425	Maximum					2.5	Median					0.28
1426	SD					0.527	CV					1.168
1427	k hat (MLE)					0.957	k star (bias corrected MLE)					0.917
1428	Theta hat (MLE)					0.471	Theta star (bias corrected MLE)					0.492
1429	nu hat (MLE)					105.3	nu star (bias corrected)					100.9
1430	Adjusted Level of Significance ( $\beta$ )					0.0456						
1431	Approximate Chi Square Value (100.91, $\alpha$ )					78.73	Adjusted Chi Square Value (100.91, $\beta$ )					78.21

	A	B	C	D	E	F	G	H	I	J	K	L
1432	95% Gamma Approximate UCL (use when n>=50)					0.578	95% Gamma Adjusted UCL (use when n<50)					0.582
1433												
1434	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1435	Mean (KM)					0.468	SD (KM)					0.514
1436	Variance (KM)					0.264	SE of Mean (KM)					0.0706
1437	k hat (KM)					0.831	k star (KM)					0.798
1438	nu hat (KM)					91.43	nu star (KM)					87.78
1439	theta hat (KM)					0.563	theta star (KM)					0.587
1440	80% gamma percentile (KM)					0.765	90% gamma percentile (KM)					1.14
1441	95% gamma percentile (KM)					1.521	99% gamma percentile (KM)					2.421
1442												
1443	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1444	Approximate Chi Square Value (87.78, $\alpha$ )					67.18	Adjusted Chi Square Value (87.78, $\beta$ )					66.7
1445	95% Gamma Approximate KM-UCL (use when n>=50)					0.612	95% Gamma Adjusted KM-UCL (use when n<50)					0.616
1446												
1447	<b>Lognormal GOF Test on Detected Observations Only</b>											
1448	Shapiro Wilk Test Statistic					0.952	<b>Shapiro Wilk GOF Test</b>					
1449	5% Shapiro Wilk Critical Value					0.943	Detected Data appear Lognormal at 5% Significance Level					
1450	Lilliefors Test Statistic					0.112	<b>Lilliefors GOF Test</b>					
1451	5% Lilliefors Critical Value					0.134	Detected Data appear Lognormal at 5% Significance Level					
1452	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1453												
1454	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1455	Mean in Original Scale					0.463	Mean in Log Scale					-1.233
1456	SD in Original Scale					0.52	SD in Log Scale					0.966
1457	95% t UCL (assumes normality of ROS data)					0.58	95% Percentile Bootstrap UCL					0.578
1458	95% BCA Bootstrap UCL					0.593	95% Bootstrap t UCL					0.631
1459	95% H-UCL (Log ROS)					0.627						
1460												
1461	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1462	KM Mean (logged)					-1.238	KM Geo Mean					0.29
1463	KM SD (logged)					1.005	95% Critical H Value (KM-Log)					2.334
1464	KM Standard Error of Mean (logged)					0.148	95% H-UCL (KM -Log)					0.661
1465	KM SD (logged)					1.005	95% Critical H Value (KM-Log)					2.334
1466	KM Standard Error of Mean (logged)					0.148						
1467												
1468	<b>DL/2 Statistics</b>											
1469	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1470	Mean in Original Scale					0.468	Mean in Log Scale					-1.193
1471	SD in Original Scale					0.516	SD in Log Scale					0.931
1472	95% t UCL (Assumes normality)					0.584	95% H-Stat UCL					0.622
1473	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1474												
1475	<b>Nonparametric Distribution Free UCL Statistics</b>											
1476	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1477												
1478	<b>Suggested UCL to Use</b>											
1479	95% KM Approximate Gamma UCL					0.612	95% GROS Approximate Gamma UCL					0.578
1480												
1481	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1482	Recommendations are based upon data size, data distribution, and skewness.											
1483	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1484	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

	A	B	C	D	E	F	G	H	I	J	K	L
1485												
1486	<b>Benzo(a)pyrene</b>											
1487												
1488	<b>General Statistics</b>											
1489	Total Number of Observations					58	Number of Distinct Observations					47
1490	Number of Detects					50	Number of Non-Detects					8
1491	Number of Distinct Detects					44	Number of Distinct Non-Detects					6
1492	Minimum Detect					0.01	Minimum Non-Detect					0.35
1493	Maximum Detect					3.2	Maximum Non-Detect					0.51
1494	Variance Detects					0.562	Percent Non-Detects					13.79%
1495	Mean Detects					0.696	SD Detects					0.75
1496	Median Detects					0.465	CV Detects					1.078
1497	Skewness Detects					1.839	Kurtosis Detects					3.071
1498	Mean of Logged Detects					-0.971	SD of Logged Detects					1.27
1499												
1500	<b>Normal GOF Test on Detects Only</b>											
1501	Shapiro Wilk Test Statistic					0.776	<b>Shapiro Wilk GOF Test</b>					
1502	5% Shapiro Wilk Critical Value					0.947	Detected Data Not Normal at 5% Significance Level					
1503	Lilliefors Test Statistic					0.218	<b>Lilliefors GOF Test</b>					
1504	5% Lilliefors Critical Value					0.125	Detected Data Not Normal at 5% Significance Level					
1505	<b>Detected Data Not Normal at 5% Significance Level</b>											
1506												
1507	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1508	KM Mean					0.625	KM Standard Error of Mean					0.0948
1509	KM SD					0.713	95% KM (BCA) UCL					0.787
1510	95% KM (t) UCL					0.783	95% KM (Percentile Bootstrap) UCL					0.784
1511	95% KM (z) UCL					0.781	95% KM Bootstrap t UCL					0.831
1512	90% KM Chebyshev UCL					0.909	95% KM Chebyshev UCL					1.038
1513	97.5% KM Chebyshev UCL					1.217	99% KM Chebyshev UCL					1.568
1514												
1515	<b>Gamma GOF Tests on Detected Observations Only</b>											
1516	A-D Test Statistic					0.414	<b>Anderson-Darling GOF Test</b>					
1517	5% A-D Critical Value					0.782	Detected data appear Gamma Distributed at 5% Significance Level					
1518	K-S Test Statistic					0.0935	<b>Kolmogorov-Smirnov GOF</b>					
1519	5% K-S Critical Value					0.129	Detected data appear Gamma Distributed at 5% Significance Level					
1520	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1521												
1522	<b>Gamma Statistics on Detected Data Only</b>											
1523	k hat (MLE)					0.955	k star (bias corrected MLE)					0.911
1524	Theta hat (MLE)					0.729	Theta star (bias corrected MLE)					0.764
1525	nu hat (MLE)					95.47	nu star (bias corrected)					91.08
1526	Mean (detects)					0.696						
1527												
1528	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1529	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1530	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1531	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1532	This is especially true when the sample size is small.											
1533	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1534	Minimum					0.01	Mean					0.613
1535	Maximum					3.2	Median					0.355
1536	SD					0.726	CV					1.184
1537	k hat (MLE)					0.84	k star (bias corrected MLE)					0.808

	A	B	C	D	E	F	G	H	I	J	K	L
1538					Theta hat (MLE)	0.729					Theta star (bias corrected MLE)	0.758
1539					nu hat (MLE)	97.46					nu star (bias corrected)	93.76
1540					Adjusted Level of Significance ( $\beta$ )	0.0459						
1541					Approximate Chi Square Value (93.76, $\alpha$ )	72.43					Adjusted Chi Square Value (93.76, $\beta$ )	71.95
1542					95% Gamma Approximate UCL (use when $n \geq 50$ )	0.793					95% Gamma Adjusted UCL (use when $n < 50$ )	0.799
1543												
1544	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1545					Mean (KM)	0.625					SD (KM)	0.713
1546					Variance (KM)	0.508					SE of Mean (KM)	0.0948
1547					k hat (KM)	0.768					k star (KM)	0.74
1548					nu hat (KM)	89.09					nu star (KM)	85.81
1549					theta hat (KM)	0.813					theta star (KM)	0.844
1550					80% gamma percentile (KM)	1.025					90% gamma percentile (KM)	1.548
1551					95% gamma percentile (KM)	2.084					99% gamma percentile (KM)	3.36
1552												
1553	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1554					Approximate Chi Square Value (85.81, $\alpha$ )	65.46					Adjusted Chi Square Value (85.81, $\beta$ )	65.01
1555					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.819					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	0.825
1556												
1557	<b>Lognormal GOF Test on Detected Observations Only</b>											
1558					Shapiro Wilk Test Statistic	0.946					<b>Shapiro Wilk GOF Test</b>	
1559					5% Shapiro Wilk Critical Value	0.947					Detected Data Not Lognormal at 5% Significance Level	
1560					Lilliefors Test Statistic	0.117					<b>Lilliefors GOF Test</b>	
1561					5% Lilliefors Critical Value	0.125					Detected Data appear Lognormal at 5% Significance Level	
1562	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>											
1563												
1564	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1565					Mean in Original Scale	0.619					Mean in Log Scale	-1.113
1566					SD in Original Scale	0.721					SD in Log Scale	1.235
1567					95% t UCL (assumes normality of ROS data)	0.777					95% Percentile Bootstrap UCL	0.782
1568					95% BCA Bootstrap UCL	0.803					95% Bootstrap t UCL	0.805
1569					95% H-UCL (Log ROS)	1.107						
1570												
1571	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1572					KM Mean (logged)	-1.122					KM Geo Mean	0.325
1573					KM SD (logged)	1.281					95% Critical H Value (KM-Log)	2.841
1574					KM Standard Error of Mean (logged)	0.179					95% H-UCL (KM -Log)	1.197
1575					KM SD (logged)	1.281					95% Critical H Value (KM-Log)	2.841
1576					KM Standard Error of Mean (logged)	0.179						
1577												
1578	<b>DL/2 Statistics</b>											
1579	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1580					Mean in Original Scale	0.626					Mean in Log Scale	-1.065
1581					SD in Original Scale	0.717					SD in Log Scale	1.202
1582					95% t UCL (Assumes normality)	0.784					95% H-Stat UCL	1.089
1583	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1584												
1585	<b>Nonparametric Distribution Free UCL Statistics</b>											
1586	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1587												
1588	<b>Suggested UCL to Use</b>											
1589					95% KM Approximate Gamma UCL	0.819						
1590												

	A	B	C	D	E	F	G	H	I	J	K	L				
1591	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.															
1592	Recommendations are based upon data size, data distribution, and skewness.															
1593	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).															
1594	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.															
1595																
1596	<b>Chrysene</b>															
1597																
1598	<b>General Statistics</b>															
1599	Total Number of Observations				59				Number of Distinct Observations				46			
1600	Number of Detects				51				Number of Non-Detects				8			
1601	Number of Distinct Detects				44				Number of Distinct Non-Detects				6			
1602	Minimum Detect				0.052				Minimum Non-Detect				0.35			
1603	Maximum Detect				3.9				Maximum Non-Detect				0.51			
1604	Variance Detects				0.681				Percent Non-Detects				13.56%			
1605	Mean Detects				0.759				SD Detects				0.825			
1606	Median Detects				0.52				CV Detects				1.086			
1607	Skewness Detects				2.139				Kurtosis Detects				4.823			
1608	Mean of Logged Detects				-0.806				SD of Logged Detects				1.114			
1609																
1610	<b>Normal GOF Test on Detects Only</b>															
1611	Shapiro Wilk Test Statistic				0.752				<b>Normal GOF Test on Detected Observations Only</b>							
1612	5% Shapiro Wilk P Value				7.308E-11				Detected Data Not Normal at 5% Significance Level							
1613	Lilliefors Test Statistic				0.255				<b>Lilliefors GOF Test</b>							
1614	5% Lilliefors Critical Value				0.123				Detected Data Not Normal at 5% Significance Level							
1615	<b>Detected Data Not Normal at 5% Significance Level</b>															
1616																
1617	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>															
1618	KM Mean				0.677				KM Standard Error of Mean				0.104			
1619	KM SD				0.788				95% KM (BCA) UCL				0.842			
1620	95% KM (t) UCL				0.85				95% KM (Percentile Bootstrap) UCL				0.856			
1621	95% KM (z) UCL				0.848				95% KM Bootstrap t UCL				0.908			
1622	90% KM Chebyshev UCL				0.988				95% KM Chebyshev UCL				1.129			
1623	97.5% KM Chebyshev UCL				1.325				99% KM Chebyshev UCL				1.709			
1624																
1625	<b>Gamma GOF Tests on Detected Observations Only</b>															
1626	A-D Test Statistic				0.581				<b>Anderson-Darling GOF Test</b>							
1627	5% A-D Critical Value				0.778				Detected data appear Gamma Distributed at 5% Significance Level							
1628	K-S Test Statistic				0.129				<b>Kolmogorov-Smirnov GOF</b>							
1629	5% K-S Critical Value				0.128				Detected Data Not Gamma Distributed at 5% Significance Level							
1630	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>															
1631																
1632	<b>Gamma Statistics on Detected Data Only</b>															
1633	k hat (MLE)				1.079				k star (bias corrected MLE)				1.029			
1634	Theta hat (MLE)				0.704				Theta star (bias corrected MLE)				0.738			
1635	nu hat (MLE)				110.1				nu star (bias corrected)				104.9			
1636	Mean (detects)				0.759											
1637																
1638	<b>Gamma ROS Statistics using Imputed Non-Detects</b>															
1639	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs															
1640	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)															
1641	For such situations, GROS method may yield incorrect values of UCLs and BTVs															
1642	This is especially true when the sample size is small.															
1643	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates															

	A	B	C	D	E	F	G	H	I	J	K	L
1644					Minimum	0.01					Mean	0.662
1645					Maximum	3.9					Median	0.44
1646					SD	0.805					CV	1.217
1647					k hat (MLE)	0.763					k star (bias corrected MLE)	0.735
1648					Theta hat (MLE)	0.867					Theta star (bias corrected MLE)	0.9
1649					nu hat (MLE)	90.03					nu star (bias corrected)	86.78
1650					Adjusted Level of Significance ( $\beta$ )	0.0459						
1651					Approximate Chi Square Value (86.78, $\alpha$ )	66.31					Adjusted Chi Square Value (86.78, $\beta$ )	65.86
1652					95% Gamma Approximate UCL (use when $n \geq 50$ )	0.866					95% Gamma Adjusted UCL (use when $n < 50$ )	0.872
1653												
1654	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1655					Mean (KM)	0.677					SD (KM)	0.788
1656					Variance (KM)	0.621					SE of Mean (KM)	0.104
1657					k hat (KM)	0.738					k star (KM)	0.711
1658					nu hat (KM)	87.03					nu star (KM)	83.94
1659					theta hat (KM)	0.918					theta star (KM)	0.952
1660					80% gamma percentile (KM)	1.112					90% gamma percentile (KM)	1.693
1661					95% gamma percentile (KM)	2.291					99% gamma percentile (KM)	3.716
1662												
1663	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1664					Approximate Chi Square Value (83.94, $\alpha$ )	63.82					Adjusted Chi Square Value (83.94, $\beta$ )	63.38
1665					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.89					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	0.896
1666												
1667	<b>Lognormal GOF Test on Detected Observations Only</b>											
1668					Shapiro Wilk Approximate Test Statistic	0.95					<b>Shapiro Wilk GOF Test</b>	
1669					5% Shapiro Wilk P Value	0.0565					Detected Data appear Lognormal at 5% Significance Level	
1670					Lilliefors Test Statistic	0.109					<b>Lilliefors GOF Test</b>	
1671					5% Lilliefors Critical Value	0.123					Detected Data appear Lognormal at 5% Significance Level	
1672	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1673												
1674	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1675					Mean in Original Scale	0.677					Mean in Log Scale	-0.959
1676					SD in Original Scale	0.795					SD in Log Scale	1.109
1677					95% t UCL (assumes normality of ROS data)	0.849					95% Percentile Bootstrap UCL	0.857
1678					95% BCA Bootstrap UCL	0.895					95% Bootstrap t UCL	0.901
1679					95% H-UCL (Log ROS)	1.024						
1680												
1681	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1682					KM Mean (logged)	-0.979					KM Geo Mean	0.376
1683					KM SD (logged)	1.139					95% Critical H Value (KM-Log)	2.583
1684					KM Standard Error of Mean (logged)	0.154					95% H-UCL (KM -Log)	1.058
1685					KM SD (logged)	1.139					95% Critical H Value (KM-Log)	2.583
1686					KM Standard Error of Mean (logged)	0.154						
1687												
1688	<b>DL/2 Statistics</b>											
1689	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1690					Mean in Original Scale	0.682					Mean in Log Scale	-0.921
1691					SD in Original Scale	0.791					SD in Log Scale	1.076
1692					95% t UCL (Assumes normality)	0.855					95% H-Stat UCL	1.006
1693	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1694												
1695	<b>Nonparametric Distribution Free UCL Statistics</b>											
1696	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											



	A	B	C	D	E	F	G	H	I	J	K	L
1697												
1698	<b>Suggested UCL to Use</b>											
1699	95% KM Approximate Gamma UCL					0.89	95% GROS Approximate Gamma UCL					0.866
1700												
1701	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1702	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1703												
1704	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1705	Recommendations are based upon data size, data distribution, and skewness.											
1706	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1707	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1708												
1709	<b>Dibenz(a,h)anthracene</b>											
1710												
1711	<b>General Statistics</b>											
1712	Total Number of Observations				34	Number of Distinct Observations				19		
1713	Number of Detects				16	Number of Non-Detects				18		
1714	Number of Distinct Detects				13	Number of Distinct Non-Detects				7		
1715	Minimum Detect				0.064	Minimum Non-Detect				0.35		
1716	Maximum Detect				0.45	Maximum Non-Detect				0.51		
1717	Variance Detects				0.0158	Percent Non-Detects				52.94%		
1718	Mean Detects				0.196	SD Detects				0.126		
1719	Median Detects				0.15	CV Detects				0.64		
1720	Skewness Detects				0.789	Kurtosis Detects				-0.719		
1721	Mean of Logged Detects				-1.823	SD of Logged Detects				0.646		
1722												
1723	<b>Normal GOF Test on Detects Only</b>											
1724	Shapiro Wilk Test Statistic				0.873	<b>Shapiro Wilk GOF Test</b>						
1725	5% Shapiro Wilk Critical Value				0.887	Detected Data Not Normal at 5% Significance Level						
1726	Lilliefors Test Statistic				0.238	<b>Lilliefors GOF Test</b>						
1727	5% Lilliefors Critical Value				0.213	Detected Data Not Normal at 5% Significance Level						
1728	<b>Detected Data Not Normal at 5% Significance Level</b>											
1729												
1730	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1731	KM Mean				0.174	KM Standard Error of Mean				0.0245		
1732	KM SD				0.106	95% KM (BCA) UCL				0.22		
1733	95% KM (t) UCL				0.215	95% KM (Percentile Bootstrap) UCL				0.217		
1734	95% KM (z) UCL				0.214	95% KM Bootstrap t UCL				0.219		
1735	90% KM Chebyshev UCL				0.247	95% KM Chebyshev UCL				0.281		
1736	97.5% KM Chebyshev UCL				0.327	99% KM Chebyshev UCL				0.418		
1737												
1738	<b>Gamma GOF Tests on Detected Observations Only</b>											
1739	A-D Test Statistic				0.553	<b>Anderson-Darling GOF Test</b>						
1740	5% A-D Critical Value				0.746	Detected data appear Gamma Distributed at 5% Significance Level						
1741	K-S Test Statistic				0.172	<b>Kolmogorov-Smirnov GOF</b>						
1742	5% K-S Critical Value				0.217	Detected data appear Gamma Distributed at 5% Significance Level						
1743	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1744												
1745	<b>Gamma Statistics on Detected Data Only</b>											
1746	k hat (MLE)				2.735	k star (bias corrected MLE)				2.264		
1747	Theta hat (MLE)				0.0717	Theta star (bias corrected MLE)				0.0866		
1748	nu hat (MLE)				87.54	nu star (bias corrected)				72.46		
1749	Mean (detects)				0.196							

	A	B	C	D	E	F	G	H	I	J	K	L
1750												
1751	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1752	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1753	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1754	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1755	This is especially true when the sample size is small.											
1756	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1757		Minimum	0.0517							Mean	0.171	
1758		Maximum	0.45							Median	0.15	
1759		SD	0.096							CV	0.562	
1760		k hat (MLE)	3.799							k star (bias corrected MLE)	3.483	
1761		Theta hat (MLE)	0.045							Theta star (bias corrected MLE)	0.049	
1762		nu hat (MLE)	258.3							nu star (bias corrected)	236.9	
1763		Adjusted Level of Significance ( $\beta$ )	0.0422									
1764		Approximate Chi Square Value (236.87, $\alpha$ )	202.2							Adjusted Chi Square Value (236.87, $\beta$ )	200.7	
1765		95% Gamma Approximate UCL (use when $n \geq 50$ )	0.2							95% Gamma Adjusted UCL (use when $n < 50$ )	0.202	
1766												
1767	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1768		Mean (KM)	0.174							SD (KM)	0.106	
1769		Variance (KM)	0.0111							SE of Mean (KM)	0.0245	
1770		k hat (KM)	2.712							k star (KM)	2.492	
1771		nu hat (KM)	184.4							nu star (KM)	169.5	
1772		theta hat (KM)	0.0641							theta star (KM)	0.0697	
1773		80% gamma percentile (KM)	0.253							90% gamma percentile (KM)	0.321	
1774		95% gamma percentile (KM)	0.385							99% gamma percentile (KM)	0.525	
1775												
1776	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1777		Approximate Chi Square Value (169.46, $\alpha$ )	140.4							Adjusted Chi Square Value (169.46, $\beta$ )	139	
1778		95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.21							95% Gamma Adjusted KM-UCL (use when $n < 50$ )	0.212	
1779												
1780	<b>Lognormal GOF Test on Detected Observations Only</b>											
1781		Shapiro Wilk Test Statistic	0.931							<b>Shapiro Wilk GOF Test</b>		
1782		5% Shapiro Wilk Critical Value	0.887							Detected Data appear Lognormal at 5% Significance Level		
1783		Lilliefors Test Statistic	0.144							<b>Lilliefors GOF Test</b>		
1784		5% Lilliefors Critical Value	0.213							Detected Data appear Lognormal at 5% Significance Level		
1785	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1786												
1787	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1788		Mean in Original Scale	0.167							Mean in Log Scale	-1.925	
1789		SD in Original Scale	0.0954							SD in Log Scale	0.512	
1790		95% t UCL (assumes normality of ROS data)	0.195							95% Percentile Bootstrap UCL	0.195	
1791		95% BCA Bootstrap UCL	0.199							95% Bootstrap t UCL	0.202	
1792		95% H-UCL (Log ROS)	0.198									
1793												
1794	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1795		KM Mean (logged)	-1.921							KM Geo Mean	0.146	
1796		KM SD (logged)	0.578							95% Critical H Value (KM-Log)	2.004	
1797		KM Standard Error of Mean (logged)	0.143							95% H-UCL (KM -Log)	0.212	
1798		KM SD (logged)	0.578							95% Critical H Value (KM-Log)	2.004	
1799		KM Standard Error of Mean (logged)	0.143									
1800												
1801	<b>DL/2 Statistics</b>											
1802	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
1803	Mean in Original Scale				0.191	Mean in Log Scale				-1.748		
1804	SD in Original Scale				0.0861	SD in Log Scale				0.448		
1805	95% t UCL (Assumes normality)				0.216	95% H-Stat UCL				0.223		
1806	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1807												
1808	<b>Nonparametric Distribution Free UCL Statistics</b>											
1809	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1810												
1811	<b>Suggested UCL to Use</b>											
1812	95% KM Adjusted Gamma UCL				0.212	95% GROS Adjusted Gamma UCL				0.202		
1813												
1814	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1815	Recommendations are based upon data size, data distribution, and skewness.											
1816	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1817	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1818												
1819	<b>Indeno(1,2,3-cd)pyrene</b>											
1820												
1821	<b>General Statistics</b>											
1822	Total Number of Observations				49	Number of Distinct Observations				36		
1823	Number of Detects				39	Number of Non-Detects				10		
1824	Number of Distinct Detects				32	Number of Distinct Non-Detects				6		
1825	Minimum Detect				0.04	Minimum Non-Detect				0.35		
1826	Maximum Detect				1.9	Maximum Non-Detect				0.51		
1827	Variance Detects				0.196	Percent Non-Detects				20.41%		
1828	Mean Detects				0.44	SD Detects				0.443		
1829	Median Detects				0.24	CV Detects				1.005		
1830	Skewness Detects				1.703	Kurtosis Detects				2.667		
1831	Mean of Logged Detects				-1.282	SD of Logged Detects				1.008		
1832												
1833	<b>Normal GOF Test on Detects Only</b>											
1834	Shapiro Wilk Test Statistic				0.796	<b>Shapiro Wilk GOF Test</b>						
1835	5% Shapiro Wilk Critical Value				0.939	Detected Data Not Normal at 5% Significance Level						
1836	Lilliefors Test Statistic				0.213	<b>Lilliefors GOF Test</b>						
1837	5% Lilliefors Critical Value				0.14	Detected Data Not Normal at 5% Significance Level						
1838	<b>Detected Data Not Normal at 5% Significance Level</b>											
1839												
1840	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1841	KM Mean				0.385	KM Standard Error of Mean				0.0592		
1842	KM SD				0.407	95% KM (BCA) UCL				0.486		
1843	95% KM (t) UCL				0.484	95% KM (Percentile Bootstrap) UCL				0.483		
1844	95% KM (z) UCL				0.482	95% KM Bootstrap t UCL				0.506		
1845	90% KM Chebyshev UCL				0.563	95% KM Chebyshev UCL				0.643		
1846	97.5% KM Chebyshev UCL				0.755	99% KM Chebyshev UCL				0.974		
1847												
1848	<b>Gamma GOF Tests on Detected Observations Only</b>											
1849	A-D Test Statistic				0.518	<b>Anderson-Darling GOF Test</b>						
1850	5% A-D Critical Value				0.773	Detected data appear Gamma Distributed at 5% Significance Level						
1851	K-S Test Statistic				0.128	<b>Kolmogorov-Smirnov GOF</b>						
1852	5% K-S Critical Value				0.145	Detected data appear Gamma Distributed at 5% Significance Level						
1853	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1854												
1855	<b>Gamma Statistics on Detected Data Only</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1856					k hat (MLE)	1.223				k star (bias corrected MLE)		1.146
1857					Theta hat (MLE)	0.36				Theta star (bias corrected MLE)		0.384
1858					nu hat (MLE)	95.38				nu star (bias corrected)		89.38
1859					Mean (detects)	0.44						
1860												
1861	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1862	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1863	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1864	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1865	This is especially true when the sample size is small.											
1866	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1867					Minimum	0.01				Mean		0.38
1868					Maximum	1.9				Median		0.21
1869					SD	0.413				CV		1.089
1870					k hat (MLE)	1.132				k star (bias corrected MLE)		1.076
1871					Theta hat (MLE)	0.335				Theta star (bias corrected MLE)		0.353
1872					nu hat (MLE)	110.9				nu star (bias corrected)		105.5
1873					Adjusted Level of Significance ( $\beta$ )	0.0451						
1874					Approximate Chi Square Value (105.45, $\alpha$ )	82.75				Adjusted Chi Square Value (105.45, $\beta$ )		82.14
1875					95% Gamma Approximate UCL (use when $n \geq 50$ )	0.484				95% Gamma Adjusted UCL (use when $n < 50$ )		0.487
1876												
1877	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1878					Mean (KM)	0.385				SD (KM)		0.407
1879					Variance (KM)	0.165				SE of Mean (KM)		0.0592
1880					k hat (KM)	0.896				k star (KM)		0.855
1881					nu hat (KM)	87.78				nu star (KM)		83.74
1882					theta hat (KM)	0.43				theta star (KM)		0.451
1883					80% gamma percentile (KM)	0.627				90% gamma percentile (KM)		0.921
1884					95% gamma percentile (KM)	1.22				99% gamma percentile (KM)		1.921
1885												
1886	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1887					Approximate Chi Square Value (83.74, $\alpha$ )	63.65				Adjusted Chi Square Value (83.74, $\beta$ )		63.12
1888					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.507				95% Gamma Adjusted KM-UCL (use when $n < 50$ )		0.511
1889												
1890	<b>Lognormal GOF Test on Detected Observations Only</b>											
1891					Shapiro Wilk Test Statistic	0.974				<b>Shapiro Wilk GOF Test</b>		
1892					5% Shapiro Wilk Critical Value	0.939				Detected Data appear Lognormal at 5% Significance Level		
1893					Lilliefors Test Statistic	0.0703				<b>Lilliefors GOF Test</b>		
1894					5% Lilliefors Critical Value	0.14				Detected Data appear Lognormal at 5% Significance Level		
1895	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1896												
1897	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1898					Mean in Original Scale	0.384				Mean in Log Scale		-1.404
1899					SD in Original Scale	0.41				SD in Log Scale		0.943
1900					95% t UCL (assumes normality of ROS data)	0.482				95% Percentile Bootstrap UCL		0.485
1901					95% BCA Bootstrap UCL	0.501				95% Bootstrap t UCL		0.506
1902					95% H-UCL (Log ROS)	0.523						
1903												
1904	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1905					KM Mean (logged)	-1.418				KM Geo Mean		0.242
1906					KM SD (logged)	0.97				95% Critical H Value (KM-Log)		2.307
1907					KM Standard Error of Mean (logged)	0.148				95% H-UCL (KM -Log)		0.535
1908					KM SD (logged)	0.97				95% Critical H Value (KM-Log)		2.307

	A	B	C	D	E	F	G	H	I	J	K	L
1909	KM Standard Error of Mean (logged)					0.148						
1910												
1911	<b>DL/2 Statistics</b>											
1912	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1913	Mean in Original Scale					0.389	Mean in Log Scale					-1.361
1914	SD in Original Scale					0.407	SD in Log Scale					0.912
1915	95% t UCL (Assumes normality)					0.487	95% H-Stat UCL					0.522
1916	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1917												
1918	<b>Nonparametric Distribution Free UCL Statistics</b>											
1919	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1920												
1921	<b>Suggested UCL to Use</b>											
1922	95% KM Adjusted Gamma UCL					0.511	95% GROS Adjusted Gamma UCL					0.487
1923												
1924	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1925	Recommendations are based upon data size, data distribution, and skewness.											
1926	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1927	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1928												

## ***Appendix B-4 Bell Slip AOC***

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{crit}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_c$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{crit}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{crit}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{n,c}$ (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
$AF_{r,c}$ (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
$AF_{6-16}$ (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
$AF_{16-20}$ (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
$AF_{rec-a}$ (skin adherence factor - adult) mg/cm <sup>2</sup>	0.07	0.07
$AF_{rec-c}$ (skin adherence factor - child) mg/cm <sup>2</sup>	0.2	0.2

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
AT <sub>rec</sub> (averaging time)	365	365
BW <sub>n,r</sub> (body weight) kg	15	15
BW <sub>γ,r</sub> (body weight) kg	15	15
BW <sub>6-16</sub> (body weight) kg	80	80
BW <sub>16-20</sub> (body weight) kg	80	80
BW <sub>rec,a</sub> (body weight - adult) kg	80	80
BW <sub>rec,c</sub> (body weight - child) kg	15	15
DFS <sub>rec,arti</sub> (age-adjusted soil dermal factor) mg/kg	.	27767.6
DFS <sub>M,rec,arti</sub> (mutagenic age-adjusted soil dermal factor) mg/kg	.	115018.4
ED <sub>rec</sub> (exposure duration - recreator) years	26	26
ED <sub>n,r</sub> (exposure duration) year	2	2
ED <sub>γ,r</sub> (exposure duration) year	4	4
ED <sub>6-16</sub> (exposure duration) year	10	10
ED <sub>16-20</sub> (exposure duration) year	10	10
ED <sub>rec,c</sub> (exposure duration - child) years	6	6
EF <sub>rec</sub> (exposure frequency) days/year	.	94
EF <sub>n,r</sub> (exposure frequency) days/year	.	94
EF <sub>γ,r</sub> (exposure frequency) days/year	.	94
EF <sub>6-16</sub> (exposure frequency) days/year	.	94
EF <sub>16-20</sub> (exposure frequency) days/year	.	94
EF <sub>rec,a</sub> (exposure frequency - adult) days/year	.	94
EF <sub>rec,c</sub> (exposure frequency - child) days/year	.	94
ET <sub>rec</sub> (exposure time - recreator) hours/day	.	3
ET <sub>n,r</sub> (exposure time) hours/day	.	3
ET <sub>γ,r</sub> (exposure time) hours/day	.	3
ET <sub>6-16</sub> (exposure time) hours/day	.	3
ET <sub>16-20</sub> (exposure time) hours/day	.	3
ET <sub>rec,a</sub> (adult exposure time) hours/day	.	3
ET <sub>rec,c</sub> (child exposure time) hours/day	.	3
THQ (target hazard quotient) unitless	0.1	0.1



# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
IFS <sub>recre-adi</sub> (age-adjusted soil ingestion factor) mg/kg	.	9870
IFSM <sub>recre-adi</sub> (mutagenic age-adjusted soil ingestion factor) mg/kg	.	44806.667
IRS <sub>n,s</sub> (soil intake rate) mg/day	200	200
IRS <sub>γ,s</sub> (soil intake rate) mg/day	200	200
IRS <sub>κ,1,s</sub> (soil intake rate) mg/day	100	100
IRS <sub>1κ,2n</sub> (soil intake rate) mg/day	100	100
IRS <sub>recre-a</sub> (soil intake rate - adult) mg/day	100	100
IRS <sub>recre-r</sub> (soil intake rate - child) mg/day	200	200
LT (lifetime - recreator) years	70	70
SA <sub>n,s</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>γ,s</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>κ,1,s</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>1κ,2n</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>recre-a</sub> (skin surface area - adult) cm <sup>2</sup> /day	6032	6032
SA <sub>recre-r</sub> (skin surface area - child) cm <sup>2</sup> /day	2373	2373
TR (target risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>soil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>soil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

# Site-specific Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-	
Aroclor 1254	11097-69-1	No	Yes	Organics	2.00E+00	S	5.71E-04	S	2.00E-05	I	-	
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-	
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-	
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-	
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-	
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-	
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-	
DDD, p,p'- (DDD)	72-54-8	No	No	Organics	2.40E-01	I	6.90E-05	C	3.00E-05	X	-	
DDT	50-29-3	No	No	Organics	3.40E-01	I	9.70E-05	I	5.00E-04	I	-	
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-	
Endrin	72-20-8	No	No	Organics	-		-		3.00E-04	I	-	
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I
Phenanthrene	85-01-8	No	Yes	Organics	-		-		-		-	
Silver	7440-22-4	No	No	Inorganics	-		-		5.00E-03	I	-	
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		-		5.04E-03	S	1.00E-04	A
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-	

## Site-specific

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref
1	-	1	-	-	-	1.50E+03	-	-		2792.15	CRC89
0.15	-	1	-	-	-	4.50E+01	-	-		1908.15	PHYSROP
1	0.14	1	-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSROP	651.36	EPI
1	0.14	1	-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSROP	688.75	EPI
1	0.03	0.6	-	-	-	2.90E+01	-	-		888.15	PHYSROP
0.07	-	1	-	-	-	4.10E+01	-	-		1873.15	PHYSROP
1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP
1	0.13	1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP
1	0.13	1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI
1	0.13	1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP
0.025	0.001	1	-	-	-	7.50E+01	-	-		1038.15	PHYSROP
0.013	-	1	-	-	-	1.80E+06	-	-		-	
1	0.13	1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP
1	-	1	-	-	-	4.50E+01	-	-		3200.15	CRC89
1	-	1	-	-	-	3.50E+01	-	-		2868.15	PHYSROP
1	0.1	1	-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSROP	623.15	PHYSROP
1	0.03	1	-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSROP	533.15	PHYSROP
1	0.13	1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSROP
1	0.1	1	-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSROP	603.15	EPI
1	0.13	1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP
0.04	-	1	-	-	-	6.50E+01	-	-		2368.15	PHYSROP
1	-	1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP
1	0.13	1	-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSROP	613.15	PHYSROP
0.04	-	1	-	-	-	8.30E+00	-	-		2273.15	PHYSROP
1	-	1	-	5.47E+04	-	-	-	-		-	
0.026	-	1	-	-	-	1.00E+03	-	-		3680.15	CRC89
1	-	1	-	-	-	6.20E+01	-	-		1181.15	PHYSROP

# Site-specific Recreator Regional Screening Levels (RSL) for Soil

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Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)
6700	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
5070	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02	6.10E-06	1.87E-08	1.36E+09	8.43E+05	1.29E+00	3.29E+00	1.23E+02
987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09	1.36E+09	1.31E+06	1.29E+00	3.29E+00	1.92E+02
1673	CRC89	INORGANIC	-	-	-	1.36E+09	-	2.88E+00	2.04E+01	2.64E+04
3572.13	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09	4.41E+06	5.70E+00	1.71E+01	2.21E+03
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E+01	1.71E+02	6.84E+06
2291	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	6.32E+04
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	-	1.36E+09	-	5.70E+02	1.71E+03	6.84E+07
7398.48	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	1.26E+04
5123	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02	4.74E-06	-	1.36E+09	-	1.08E+01	3.83E+01	1.65E+06
799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02	4.43E-06	-	1.36E+09	-	7.61E+00	9.02E+01	1.17E+06
-		PAH	4.46E-02	5.21E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
-		PEST	3.62E-02	4.22E-06	-	1.36E+09	-	-	-	-
-		PAH	4.48E-02	5.23E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
4325	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-
869	YAWS	PAH	3.45E-02	6.69E-06	3.21E-08	1.36E+09	6.43E+05	-	-	-
6410	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-
11325	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
3170	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-

# Site-specific

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Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL Child THQ=0.1 (mg/kg)	Dermal SL Child THQ=0.1 (mg/kg)	Inhalation SL Child THQ=0.1 (mg/kg)	Noncarcinogenic SL Child THI=0.1 (mg/kg)	Ingestion SL Adult THQ=0.1 (mg/kg)	Dermal SL Adult THQ=0.1 (mg/kg)	Inhalation SL Adult THQ=0.1 (mg/kg)	Noncarcinogenic SL Adult THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	2.91E+04	-	2.11E+07	2.91E+04	3.11E+05	-	2.11E+07	3.06E+05	2.91E+04 nc
-	1.16E+01	-	-	1.16E+01	1.24E+02	-	-	1.24E+02	1.16E+01 nc
9.22E-01	5.82E-01	1.75E+00	-	4.37E-01	6.21E+00	1.05E+01	-	3.90E+00	4.37E-01 nc
9.24E-01	-	-	-	-	-	-	-	-	9.24E-01 ca
2.52E+00	1.46E+01	1.23E+02	6.33E+04	1.30E+01	1.55E+02	7.36E+02	6.33E+04	1.28E+02	2.52E+00 ca**
-	5.82E+03	-	2.11E+06	5.81E+03	6.21E+04	-	2.11E+06	6.04E+04	5.81E+03 nc
4.27E+00	-	-	-	-	-	-	-	-	4.27E+00 ca
4.28E-01	8.74E+00	2.83E+01	8.45E+03	6.67E+00	9.32E+01	1.70E+02	8.45E+03	5.97E+01	4.28E-01 ca*
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca
4.28E+01	-	-	-	-	-	-	-	-	4.28E+01 ca
6.32E+04	2.91E+01	3.07E+02	4.22E+04	2.66E+01	3.11E+02	1.84E+03	4.22E+04	2.64E+02	2.66E+01 nc
-	4.37E+04	-	-	4.37E+04	4.66E+05	-	-	4.66E+05	4.37E+04 nc
4.28E+02	-	-	-	-	-	-	-	-	4.28E+02 ca
1.26E+04	8.74E+00	-	2.53E+04	8.73E+00	9.32E+01	-	2.53E+04	9.28E+01	8.73E+00 nc
-	1.16E+03	-	-	1.16E+03	1.24E+04	-	-	1.24E+04	1.16E+03 nc
8.42E+00	8.74E-01	3.68E+00	-	7.06E-01	9.32E+00	2.21E+01	-	6.55E+00	7.06E-01 nc
7.02E+00	1.46E+01	2.05E+02	-	1.36E+01	1.55E+02	1.23E+03	-	1.38E+02	7.02E+00 ca**
4.28E-01	-	-	-	-	-	-	-	-	4.28E-01 ca
-	8.74E+00	3.68E+01	-	7.06E+00	9.32E+01	2.21E+02	-	6.55E+01	7.06E+00 nc
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca
-	6.99E+02	-	2.11E+05	6.97E+02	7.46E+03	-	2.11E+05	7.20E+03	6.97E+02 nc
-	-	-	3.23E+01	3.23E+01	-	-	3.23E+01	3.23E+01	3.23E+01 sat
-	-	-	-	-	-	-	-	-	
-	1.46E+02	-	-	1.46E+02	1.55E+03	-	-	1.55E+03	1.46E+02 nc
-	5.82E-01	-	-	5.82E-01	6.21E+00	-	-	6.21E+00	5.82E-01 nc
-	1.47E+02	-	4.22E+05	1.47E+02	1.57E+03	-	4.22E+05	1.56E+03	1.47E+02 nc
-	8.74E+03	-	-	8.74E+03	9.32E+04	-	-	9.32E+04	8.74E+03 nc

# Site-specific Recreator Risk for Soil

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-
Aroclor 1254	2.00E+00	S	5.71E-04	S	2.00E-05	I	-	-	1	0.14	1	-	4.30E-02
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.44E-02
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-
DDD, p,p'- (DDD)	2.40E-01	I	6.90E-05	C	3.00E-05	X	-	-	1	0.1	1	-	9.00E-02
DDT	3.40E-01	I	9.70E-05	I	5.00E-04	I	-	-	1	0.03	1	-	5.50E-03
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03
Endrin	-	-	-	-	3.00E-04	I	-	-	1	0.1	1	-	2.50E-01
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02
Phenanthrene	-	-	-	-	-	-	-	-	1	0.13	1	-	1.15E+00
Silver	-	-	-	-	5.00E-03	I	-	-	0.04	-	1	-	-
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04
Vanadium and Compounds	-	-	-	-	5.04E-03	S	1.00E-04	A	0.026	-	1	-	-
Zinc and Compounds	-	-	-	-	3.00E-01	I	-	-	1	-	1	-	-
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Recreator Risk for Soil

Chemical	K <sub>oc</sub> \ (cm <sup>3</sup> /g)	K <sub>d</sub> \ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref
Aluminum	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89
Antimony (metallic)	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS
Aroclor 1254	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil
Aroclor 1260	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil
Arsenic, Inorganic	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89
Barium	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS
Benz[a]anthracene	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS
Benzo[a]pyrene	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-	
Benzo[b]fluoranthene	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-	
Benzo[k]fluoranthene	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-	
Cadmium (Diet)	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS
Chromium(III), Insoluble Salts	-	1.80E+06	-	-		-		-	
Chrysene	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS
Cobalt	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS
Copper	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS
DDD, p,p'- (DDD)	1.18E+05	-	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP	934.725	Approx. from Tcrit=1.5xTBoil
DDT	1.69E+05	-	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP	799.725	Approx. from Tcrit=1.5xTBoil
Dibenz[a,h]anthracene	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-	
Endrin	2.01E+04	-	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI	-	
Indeno[1,2,3-cd]pyrene	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-	
Manganese (Non-diet)	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89
Mercury (elemental)	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89
Phenanthrene	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS
Silver	-	8.30E+00	-	-		2273.15	PHYSPROP	6410	CRC89
Thallium Sulfate	-	-	-	-		-		-	
Vanadium and Compounds	-	1.00E+03	-	-		3680.15	CRC89	11325	YAWS
Zinc and Compounds	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS
<i>*Total Risk/HI</i>	-	-	-	-		-		-	

# Site-specific Recreator Risk for Soil

Chemical	Chemical Type	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk
Aluminum	INORGANIC	-	-	-	1.36E+09	-	1.97E+04	-	-	-
Antimony (metallic)	INORGANIC	-	-	-	1.36E+09	-	4.44E+00	-	-	-
Aroclor 1254	PCB	2.37E-02	6.10E-06	1.87E-08	1.36E+09	8.43E+05	4.40E-01	3.40E-07	1.34E-07	3.57E-09
Aroclor 1260	PCB	2.20E-02	5.61E-06	7.70E-09	1.36E+09	1.31E+06	1.66E-01	1.28E-07	5.05E-08	8.64E-10
Arsenic, Inorganic	INORGANIC	-	-	-	1.36E+09	-	1.40E+01	4.88E-06	6.87E-07	5.31E-10
Barium	INORGANIC	-	-	-	1.36E+09	-	3.71E+02	-	-	-
Benz[a]anthracene	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09	4.41E+06	1.89E+00	3.31E-07	1.11E-07	8.54E-10
Benzo[a]pyrene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	1.73E+00	3.03E-06	1.01E-06	2.53E-11
Benzo[b]fluoranthene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	2.38E+00	4.17E-07	1.39E-07	3.48E-12
Benzo[k]fluoranthene	PAH	4.76E-02	5.56E-06	-	1.36E+09	-	1.03E+00	1.81E-08	6.03E-09	1.51E-13
Cadmium (Diet)	INORGANIC	-	-	-	1.36E+09	-	8.84E+00	-	-	1.40E-10
Chromium(III), Insoluble Salts	INORGANIC	-	-	-	1.36E+09	-	2.37E+02	-	-	-
Chrysene	PAH	2.61E-02	6.75E-06	-	1.36E+09	-	1.89E+00	3.31E-09	1.11E-09	2.76E-14
Cobalt	INORGANIC	-	-	-	1.36E+09	-	4.72E+00	-	-	3.74E-10
Copper	INORGANIC	-	-	-	1.36E+09	-	9.89E+02	-	-	-
DDD, p,p`- (DDD)	PEST	4.06E-02	4.74E-06	-	1.36E+09	-	8.00E-03	7.42E-10	2.09E-10	4.86E-15
DDT	PEST	3.79E-02	4.43E-06	-	1.36E+09	-	1.50E-02	1.97E-09	1.66E-10	1.28E-14
Dibenz[a,h]anthracene	PAH	4.46E-02	5.21E-06	-	1.36E+09	-	4.47E-01	7.84E-07	2.62E-07	6.53E-12
Endrin	PEST	3.62E-02	4.22E-06	-	1.36E+09	-	1.30E-02	-	-	-
Indeno[1,2,3-cd]pyrene	PAH	4.48E-02	5.23E-06	-	1.36E+09	-	1.32E+00	2.31E-07	7.72E-08	1.93E-12
Manganese (Non-diet)	INORGANIC	-	-	-	1.36E+09	-	1.63E+03	-	-	-
Mercury (elemental)	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09	3.47E+04	5.38E-01	-	-	-
Phenanthrene	PAH	3.45E-02	6.69E-06	3.21E-08	1.36E+09	6.43E+05	3.00E+00	-	-	-
Silver	INORGANIC	-	-	-	1.36E+09	-	8.23E+00	-	-	-
Thallium Sulfate	INORGANIC	-	-	-	1.36E+09	-	2.65E+00	-	-	-
Vanadium and Compounds	INORGANIC	-	-	-	1.36E+09	-	2.02E+01	-	-	-
Zinc and Compounds	INORGANIC	-	-	-	1.36E+09	-	1.12E+03	-	-	-
<b>*Total Risk/HI</b>		-	-	-	-	-	-	<b>1.02E-05</b>	<b>2.48E-06</b>	<b>6.37E-09</b>



# Site-specific Recreator Risk for Soil

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Inhalation Child HQ	Noncarcinogenic Child HI	Ingestion Adult HQ	Dermal Adult HQ	Inhalation Adult HQ	Noncarcinogenic Adult HI
Aluminum	-	6.77E-02	-	9.34E-05	6.78E-02	6.35E-03	-	9.34E-05	6.44E-03
Antimony (metallic)	-	3.81E-02	-	-	3.81E-02	3.57E-03	-	-	3.57E-03
Aroclor 1254	4.77E-07	7.55E-02	2.51E-02	-	1.01E-01	7.08E-03	4.19E-03	-	1.13E-02
Aroclor 1260	1.80E-07	-	-	-	-	-	-	-	-
Arsenic, Inorganic	5.57E-06	9.64E-02	1.14E-02	2.22E-05	1.08E-01	9.04E-03	1.91E-03	2.22E-05	1.10E-02
Barium	-	6.37E-03	-	1.76E-05	6.39E-03	5.97E-04	-	1.76E-05	6.15E-04
Benz[a]anthracene	4.43E-07	-	-	-	-	-	-	-	-
Benzo[a]pyrene	4.05E-06	1.98E-02	6.11E-03	2.05E-05	2.59E-02	1.86E-03	1.02E-03	2.05E-05	2.90E-03
Benzo[b]fluoranthene	5.57E-07	-	-	-	-	-	-	-	-
Benzo[k]fluoranthene	2.41E-08	-	-	-	-	-	-	-	-
Cadmium (Diet)	1.40E-10	3.04E-02	2.88E-03	2.09E-05	3.33E-02	2.85E-03	4.81E-04	2.09E-05	3.35E-03
Chromium(III), Insoluble Salts	-	5.43E-04	-	-	5.43E-04	5.09E-05	-	-	5.09E-05
Chrysene	4.42E-09	-	-	-	-	-	-	-	-
Cobalt	3.74E-10	5.40E-02	-	1.86E-05	5.40E-02	5.06E-03	-	1.86E-05	5.08E-03
Copper	-	8.49E-02	-	-	8.49E-02	7.96E-03	-	-	7.96E-03
DDD, p,p'- (DDD)	9.50E-10	9.16E-04	2.17E-04	-	1.13E-03	8.58E-05	3.62E-05	-	1.22E-04
DDT	2.14E-09	1.03E-04	7.33E-06	-	1.10E-04	9.66E-06	1.22E-06	-	1.09E-05
Dibenz[a,h]anthracene	1.05E-06	-	-	-	-	-	-	-	-
Endrin	-	1.49E-04	3.53E-05	-	1.84E-04	1.39E-05	5.89E-06	-	1.98E-05
Indeno[1,2,3-cd]pyrene	3.09E-07	-	-	-	-	-	-	-	-
Manganese (Non-diet)	-	2.33E-01	-	7.72E-04	2.34E-01	2.19E-02	-	7.72E-04	2.26E-02
Mercury (elemental)	-	-	-	1.66E-03	1.66E-03	-	-	1.66E-03	1.66E-03
Phenanthrene	-	-	-	-	-	-	-	-	-
Silver	-	5.65E-03	-	-	5.65E-03	5.30E-04	-	-	5.30E-04
Thallium Sulfate	-	4.55E-01	-	-	4.55E-01	4.27E-02	-	-	4.27E-02
Vanadium and Compounds	-	1.38E-02	-	4.79E-06	1.38E-02	1.29E-03	-	4.79E-06	1.30E-03
Zinc and Compounds	-	1.28E-02	-	-	1.28E-02	1.20E-03	-	-	1.20E-03
<b>*Total Risk/HI</b>	<b>1.27E-05</b>	<b>1.20E+00</b>	<b>4.58E-02</b>	<b>2.63E-03</b>	<b>1.24E+00</b>	<b>1.12E-01</b>	<b>7.64E-03</b>	<b>2.63E-03</b>	<b>1.22E-01</b>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{soil}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{veg}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>0</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Aroclor 1254	11097-69-1	No	Yes	Organics	2.00E+00	S	5.71E-04	S	2.00E-05	I	-		1	0.14	1
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-
-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02
-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-		PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-		PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-		PAH	4.76E-02
-	-	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC	-
-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-

# Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
6.10E-06	1.87E-08	1.36E+09	8.43E+05	3.30E+00	5.56E+00	3.64E+01	1.96E+00	4.71E+00	7.95E+00	-	2.96E+00	1.96E+00 ca**
5.61E-06	7.70E-09	1.36E+09	1.31E+06	3.30E+00	5.56E+00	5.68E+01	2.00E+00	-	-	-	-	2.00E+00 ca
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	1.87E+04	1.87E+04	2.35E+02	1.39E+03	1.20E+04	1.98E+02	1.98E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc

## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
DDD, p,p`- (DDD)	72-54-8	No	No	Organics	2.40E-01	I	6.90E-05	C	3.00E-05	X	-		1	0.1	1
DDT	50-29-3	No	No	Organics	3.40E-01	I	9.70E-05	I	5.00E-04	I	-		1	0.03	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1
Endrin	72-20-8	No	No	Organics	-		-		3.00E-04	I	-		1	0.1	1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Phenanthrene	85-01-8	No	Yes	Organics	-		-		-		-		1	0.13	1
Silver	7440-22-4	No	No	Inorganics	-		-		5.00E-03	I	-		0.04	-	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		-		5.04E-03	S	1.00E-04	A	0.026	-	1
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-		1	-	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02
-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI	-		PEST	3.62E-02
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS	PAH	3.45E-02
-	-	-	8.30E+00	-	-		2273.15	PHYSPROP	6410	CRC89	INORGANIC	-
-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
-	-	-	1.00E+03	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-
-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-



# Site-specific Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

D <sub>w</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
4.74E-06	-	1.36E+09	-	2.75E+01	6.49E+01	4.87E+05	1.93E+01	7.06E+00	1.67E+01	-	4.96E+00	4.96E+00 nc
4.43E-06	-	1.36E+09	-	1.94E+01	1.53E+02	3.47E+05	1.72E+01	1.18E+02	9.27E+02	-	1.04E+02	1.72E+01 ca**
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca
4.22E-06	-	1.36E+09	-	-	-	-	-	7.06E+01	1.67E+02	-	4.96E+01	4.96E+01 nc
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
6.69E-06	3.21E-08	1.36E+09	6.43E+05	-	-	-	-	-	-	-	-	
-	-	1.36E+09	-	-	-	-	-	1.18E+03	-	-	1.18E+03	1.18E+03 nc
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc
-	-	1.36E+09	-	-	-	-	-	1.19E+03	-	1.20E+05	1.18E+03	1.18E+03 nc
-	-	1.36E+09	-	-	-	-	-	7.06E+04	-	-	7.06E+04	7.06E+04 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-	4.50E+01
Aroclor 1254	2.00E+00	S	5.71E-04	S	2.00E-05	I	-	-	1	0.14	1	-	4.30E-02	1.31E+05	7.83E+02
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.44E-02	3.50E+05	2.10E+03
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05	-
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-	-	7.50E+01
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-	3.50E+01
DDD, p,p`- (DDD)	2.40E-01	I	6.90E-05	C	3.00E-05	X	-	-	1	0.1	1	-	9.00E-02	1.18E+05	-
DDT	3.40E-01	I	9.70E-05	I	5.00E-04	I	-	-	1	0.03	1	-	5.50E-03	1.69E+05	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06	-
Endrin	-	-	-	-	3.00E-04	I	-	-	1	0.1	1	-	2.50E-01	2.01E+04	-
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Phenanthrene	-	-	-	-	-	-	-	-	1	0.13	1	-	1.15E+00	1.67E+04	1.00E+02
Silver	-	-	-	-	5.00E-03	I	-	-	0.04	-	1	-	-	-	8.30E+00
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>la</sub> (cm <sup>2</sup> /s)	D <sub>iw</sub> (cm <sup>2</sup> /s)	D <sub>A</sub> (cm <sup>2</sup> /s)
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-
Antimony (metallic)	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-	-	-
Aroclor 1254	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02	6.10E-06	1.87E-08
Aroclor 1260	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09
Arsenic, Inorganic	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-	-	-
Barium	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-	-	-
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-	-	PAH	4.76E-02	5.56E-06	-
Cadmium (Diet)	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC	-	-	-
Chromium(III), Insoluble Salts	-	-		-	-	-	-	INORGANIC	-	-	-
Chrysene	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02	6.75E-06	-
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-
Copper	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-	-	-
DDD, p,p'- (DDD)	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02	4.74E-06	-
DDT	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02	4.43E-06	-
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-	-	PAH	4.46E-02	5.21E-06	-
Endrin	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI	-	-	PEST	3.62E-02	4.22E-06	-
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-	-	PAH	4.48E-02	5.23E-06	-
Manganese (Non-diet)	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-	-	-
Mercury (elemental)	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05
Phenanthrene	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS	PAH	3.45E-02	6.69E-06	3.21E-08
Silver	-	-		2273.15	PHYSPROP	6410	CRC89	INORGANIC	-	-	-
Thallium Sulfate	-	-		-	-	-	-	INORGANIC	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m³/kg)	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	1.36E+09	-	1.97E+04	-	-	-	-	8.37E-03	-	3.28E-04	8.70E-03
Antimony (metallic)	1.36E+09	-	4.44E+00	-	-	-	-	4.71E-03	-	-	4.71E-03
Aroclor 1254	1.36E+09	8.43E+05	4.40E-01	1.33E-07	7.91E-08	1.21E-08	2.25E-07	9.34E-03	5.54E-03	-	1.49E-02
Aroclor 1260	1.36E+09	1.31E+06	1.66E-01	5.04E-08	2.98E-08	2.92E-09	8.31E-08	-	-	-	-
Arsenic, Inorganic	1.36E+09	-	1.40E+01	1.92E-06	4.06E-07	1.80E-09	2.32E-06	1.19E-02	2.52E-03	7.80E-05	1.45E-02
Barium	1.36E+09	-	3.71E+02	-	-	-	-	7.88E-04	-	6.18E-05	8.50E-04
Benz[a]anthracene	1.36E+09	4.41E+06	1.89E+00	2.87E-08	1.58E-08	1.04E-09	4.55E-08	-	-	-	-
Benzo[a]pyrene	1.36E+09	-	1.73E+00	2.62E-07	1.44E-07	3.09E-11	4.07E-07	2.45E-03	1.35E-03	7.21E-05	3.87E-03
Benzo[b]fluoranthene	1.36E+09	-	2.38E+00	3.61E-08	1.99E-08	4.25E-12	5.60E-08	-	-	-	-
Benzo[k]fluoranthene	1.36E+09	-	1.03E+00	1.56E-09	8.60E-10	1.84E-13	2.42E-09	-	-	-	-
Cadmium (Diet)	1.36E+09	-	8.84E+00	-	-	4.73E-10	4.73E-10	3.75E-03	6.36E-04	7.36E-05	4.46E-03
Chromium(III), Insoluble Salts	1.36E+09	-	2.37E+02	-	-	-	-	6.71E-05	-	-	6.71E-05
Chrysene	1.36E+09	-	1.89E+00	2.87E-10	1.58E-10	3.37E-14	4.44E-10	-	-	-	-
Cobalt	1.36E+09	-	4.72E+00	-	-	1.26E-09	1.26E-09	6.68E-03	-	6.55E-05	6.75E-03
Copper	1.36E+09	-	9.89E+02	-	-	-	-	1.05E-02	-	-	1.05E-02
DDD, p,p`- (DDD)	1.36E+09	-	8.00E-03	2.91E-10	1.23E-10	1.64E-14	4.14E-10	1.13E-04	4.79E-05	-	1.61E-04
DDT	1.36E+09	-	1.50E-02	7.73E-10	9.82E-11	4.33E-14	8.72E-10	1.27E-05	1.62E-06	-	1.44E-05
Dibenz[a,h]anthracene	1.36E+09	-	4.47E-01	6.78E-08	3.73E-08	7.98E-12	1.05E-07	-	-	-	-
Endrin	1.36E+09	-	1.30E-02	-	-	-	-	1.84E-05	7.79E-06	-	2.62E-05
Indeno[1,2,3-cd]pyrene	1.36E+09	-	1.32E+00	2.00E-08	1.10E-08	2.36E-12	3.10E-08	-	-	-	-
Manganese (Non-diet)	1.36E+09	-	1.63E+03	-	-	-	-	2.88E-02	-	2.72E-03	3.16E-02
Mercury (elemental)	1.36E+09	3.47E+04	5.38E-01	-	-	-	-	-	-	5.85E-03	5.85E-03
Phenanthrene	1.36E+09	6.43E+05	3.00E+00	-	-	-	-	-	-	-	-
Silver	1.36E+09	-	8.23E+00	-	-	-	-	6.99E-04	-	-	6.99E-04
Thallium Sulfate	1.36E+09	-	2.65E+00	-	-	-	-	5.63E-02	-	-	5.63E-02

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Vanadium and Compounds	-	-	-	-	5.04E-03	S	1.00E-04	A	0.026	-	1	-	-	-	1.00E+03
Zinc and Compounds	-	-	-	-	3.00E-01	I	-	-	1	-	1	-	-	-	6.20E+01
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>la</sub> (cm <sup>2</sup> /s)	D <sub>iw</sub> (cm <sup>2</sup> /s)	D <sub>A</sub> (cm <sup>2</sup> /s)
Vanadium and Compounds	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-	-	-
Zinc and Compounds	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-	-	-
<i>*Total Risk/HI</i>	-	-		-		-			-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Vanadium and Compounds	1.36E+09	-	2.02E+01	-	-	-	-	1.70E-03	-	1.68E-05	1.72E-03
Zinc and Compounds	1.36E+09	-	1.12E+03	-	-	-	-	1.59E-03	-	-	1.59E-03
<i>*Total Risk/HI</i>	-	-	-	<i>2.52E-06</i>	<i>7.44E-07</i>	<i>1.96E-08</i>	<i>3.28E-06</i>	<i>1.48E-01</i>	<i>1.01E-02</i>	<i>9.26E-03</i>	<i>1.67E-01</i>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{vnl}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{vnl}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124



# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

# Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Aroclor 1254	11097-69-1	No	Yes	Organics	2.00E+00	S	5.71E-04	S	2.00E-05	I	-		1	0.14	1
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-		-		1	0.14	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

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Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-
-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02
-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-	-	PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-	-	PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-	-	PAH	4.76E-02
-	-	-	7.50E+01	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC	-
-	-	-	1.80E+06	-	-		-	-	-	-	INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-

## Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

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D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
6.10E-06	1.87E-08	1.36E+09	8.43E+05	3.30E+00	5.56E+00	3.64E+01	1.96E+00	4.71E+00	7.95E+00	-	2.96E+00	1.96E+00 ca**
5.61E-06	7.70E-09	1.36E+09	1.31E+06	3.30E+00	5.56E+00	5.68E+01	2.00E+00	-	-	-	-	2.00E+00 ca
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	1.87E+04	1.87E+04	2.35E+02	1.39E+03	1.20E+04	1.98E+02	1.98E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc

## Site-specific

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Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
DDD, p,p`- (DDD)	72-54-8	No	No	Organics	2.40E-01	I	6.90E-05	C	3.00E-05	X	-		1	0.1	1
DDT	50-29-3	No	No	Organics	3.40E-01	I	9.70E-05	I	5.00E-04	I	-		1	0.03	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1
Endrin	72-20-8	No	No	Organics	-		-		3.00E-04	I	-		1	0.1	1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Phenanthrene	85-01-8	No	Yes	Organics	-		-		-		-		1	0.13	1
Silver	7440-22-4	No	No	Inorganics	-		-		5.00E-03	I	-		0.04	-	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		-		5.04E-03	S	1.00E-04	A	0.026	-	1
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	I	-		1	-	1

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02
-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI	-		PEST	3.62E-02
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS	PAH	3.45E-02
-	-	-	8.30E+00	-	-		2273.15	PHYSPROP	6410	CRC89	INORGANIC	-
-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
-	-	-	1.00E+03	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-
-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-

# Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_w \backslash$ ( $\text{cm}^2/\text{s}$ )	$D_A \backslash$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
4.74E-06	-	1.36E+09	-	2.75E+01	6.49E+01	4.87E+05	1.93E+01	7.06E+00	1.67E+01	-	4.96E+00	4.96E+00 nc
4.43E-06	-	1.36E+09	-	1.94E+01	1.53E+02	3.47E+05	1.72E+01	1.18E+02	9.27E+02	-	1.04E+02	1.72E+01 ca**
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca
4.22E-06	-	1.36E+09	-	-	-	-	-	7.06E+01	1.67E+02	-	4.96E+01	4.96E+01 nc
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
6.69E-06	3.21E-08	1.36E+09	6.43E+05	-	-	-	-	-	-	-	-	
-	-	1.36E+09	-	-	-	-	-	1.18E+03	-	-	1.18E+03	1.18E+03 nc
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc
-	-	1.36E+09	-	-	-	-	-	1.19E+03	-	1.20E+05	1.18E+03	1.18E+03 nc
-	-	1.36E+09	-	-	-	-	-	7.06E+04	-	-	7.06E+04	7.06E+04 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-	4.50E+01
Aroclor 1254	2.00E+00	S	5.71E-04	S	2.00E-05	I	-	-	1	0.14	1	-	4.30E-02	1.31E+05	7.83E+02
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1	-	1.44E-02	3.50E+05	2.10E+03
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05	-
Cadmium (Diet)	-	-	1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1	-	-	-	7.50E+01
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-	3.50E+01
DDD, p,p`- (DDD)	2.40E-01	I	6.90E-05	C	3.00E-05	X	-	-	1	0.1	1	-	9.00E-02	1.18E+05	-
DDT	3.40E-01	I	9.70E-05	I	5.00E-04	I	-	-	1	0.03	1	-	5.50E-03	1.69E+05	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06	-
Endrin	-	-	-	-	3.00E-04	I	-	-	1	0.1	1	-	2.50E-01	2.01E+04	-
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Phenanthrene	-	-	-	-	-	-	-	-	1	0.13	1	-	1.15E+00	1.67E+04	1.00E+02
Silver	-	-	-	-	5.00E-03	I	-	-	0.04	-	1	-	-	-	8.30E+00
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04	-	-



# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>la</sub> (cm <sup>2</sup> /s)	D <sub>iw</sub> (cm <sup>2</sup> /s)	D <sub>A</sub> (cm <sup>2</sup> /s)
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-
Antimony (metallic)	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-	-	-
Aroclor 1254	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02	6.10E-06	1.87E-08
Aroclor 1260	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09
Arsenic, Inorganic	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-	-	-
Barium	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-	-	-
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-	-	PAH	4.76E-02	5.56E-06	-
Cadmium (Diet)	-	-		1038.15	PHYSPROP	2291	YAWS	INORGANIC	-	-	-
Chromium(III), Insoluble Salts	-	-		-	-	-	-	INORGANIC	-	-	-
Chrysene	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02	6.75E-06	-
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-
Copper	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-	-	-
DDD, p,p'- (DDD)	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02	4.74E-06	-
DDT	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02	4.43E-06	-
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-	-	PAH	4.46E-02	5.21E-06	-
Endrin	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI	-	-	PEST	3.62E-02	4.22E-06	-
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-	-	PAH	4.48E-02	5.23E-06	-
Manganese (Non-diet)	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-	-	-
Mercury (elemental)	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05
Phenanthrene	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS	PAH	3.45E-02	6.69E-06	3.21E-08
Silver	-	-		2273.15	PHYSPROP	6410	CRC89	INORGANIC	-	-	-
Thallium Sulfate	-	-		-	-	-	-	INORGANIC	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m³/kg)	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	1.36E+09	-	1.58E+04	-	-	-	-	6.71E-03	-	2.63E-04	6.97E-03
Antimony (metallic)	1.36E+09	-	8.67E+00	-	-	-	-	9.20E-03	-	-	9.20E-03
Aroclor 1254	1.36E+09	8.43E+05	2.70E-01	8.19E-08	4.85E-08	7.41E-09	1.38E-07	5.73E-03	3.40E-03	-	9.13E-03
Aroclor 1260	1.36E+09	1.31E+06	1.32E-01	4.00E-08	2.37E-08	2.32E-09	6.61E-08	-	-	-	-
Arsenic, Inorganic	1.36E+09	-	1.55E+01	2.11E-06	4.47E-07	1.98E-09	2.56E-06	1.31E-02	2.78E-03	8.59E-05	1.60E-02
Barium	1.36E+09	-	5.87E+02	-	-	-	-	1.25E-03	-	9.78E-05	1.34E-03
Benz[a]anthracene	1.36E+09	4.41E+06	4.20E+00	6.37E-08	3.50E-08	2.32E-09	1.01E-07	-	-	-	-
Benzo[a]pyrene	1.36E+09	-	3.55E+00	5.38E-07	2.96E-07	6.34E-11	8.35E-07	5.03E-03	2.76E-03	1.48E-04	7.94E-03
Benzo[b]fluoranthene	1.36E+09	-	4.07E+00	6.17E-08	3.40E-08	7.27E-12	9.57E-08	-	-	-	-
Benzo[k]fluoranthene	1.36E+09	-	1.93E+00	2.93E-09	1.61E-09	3.45E-13	4.54E-09	-	-	-	-
Cadmium (Diet)	1.36E+09	-	5.86E+00	-	-	3.14E-10	3.14E-10	2.49E-03	4.21E-04	4.88E-05	2.96E-03
Chromium(III), Insoluble Salts	1.36E+09	-	1.89E+02	-	-	-	-	5.35E-05	-	-	5.35E-05
Chrysene	1.36E+09	-	3.81E+00	5.78E-10	3.18E-10	6.80E-14	8.96E-10	-	-	-	-
Cobalt	1.36E+09	-	4.81E+00	-	-	1.29E-09	1.29E-09	6.81E-03	-	6.68E-05	6.88E-03
Copper	1.36E+09	-	7.43E+02	-	-	-	-	7.89E-03	-	-	7.89E-03
DDD, p,p`- (DDD)	1.36E+09	-	4.43E+00	1.61E-07	6.82E-08	9.09E-12	2.30E-07	6.27E-02	2.65E-02	-	8.92E-02
DDT	1.36E+09	-	1.29E+01	6.64E-07	8.43E-08	3.72E-11	7.49E-07	1.09E-02	1.39E-03	-	1.23E-02
Dibenz[a,h]anthracene	1.36E+09	-	1.49E+00	2.26E-07	1.24E-07	2.66E-11	3.50E-07	-	-	-	-
Endrin	1.36E+09	-	9.28E-01	-	-	-	-	1.31E-03	5.56E-04	-	1.87E-03
Indeno[1,2,3-cd]pyrene	1.36E+09	-	2.50E+00	3.79E-08	2.09E-08	4.46E-12	5.88E-08	-	-	-	-
Manganese (Non-diet)	1.36E+09	-	1.25E+03	-	-	-	-	2.20E-02	-	2.07E-03	2.41E-02
Mercury (elemental)	1.36E+09	3.47E+04	3.60E-01	-	-	-	-	-	-	3.92E-03	3.92E-03
Phenanthrene	1.36E+09	6.43E+05	1.04E+01	-	-	-	-	-	-	-	-
Silver	1.36E+09	-	1.03E+01	-	-	-	-	8.76E-04	-	-	8.76E-04
Thallium Sulfate	1.36E+09	-	2.27E+00	-	-	-	-	4.82E-02	-	-	4.82E-02

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Vanadium and Compounds	-		-		5.04E-03	S	1.00E-04	A	0.026	-	1	-	-	-	1.00E+03
Zinc and Compounds	-		-		3.00E-01	I	-		1	-	1	-	-	-	6.20E+01
<i>*Total Risk/HI</i>	-		-		-		-		-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>-</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>la</sub> (cm <sup>2</sup> /s)	D <sub>iw</sub> (cm <sup>2</sup> /s)	D <sub>A</sub> (cm <sup>2</sup> /s)
Vanadium and Compounds	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-	-	-
Zinc and Compounds	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-	-	-
<i>*Total Risk/HI</i>	-	-		-		-			-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Vanadium and Compounds	1.36E+09	-	2.06E+01	-	-	-	-	1.74E-03	-	1.72E-05	1.75E-03
Zinc and Compounds	1.36E+09	-	1.24E+03	-	-	-	-	1.76E-03	-	-	1.76E-03
<i>*Total Risk/HI</i>	-	-	-	<i>3.99E-06</i>	<i>1.18E-06</i>	<i>1.58E-08</i>	<i>5.19E-06</i>	<i>2.08E-01</i>	<i>3.78E-02</i>	<i>6.72E-03</i>	<i>2.52E-01</i>

# Site-specific Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
A (PEF Dispersion Constant)	2.4538	2.4538
$A_{site}$ (areal extent of site) $m^2$	2023.43	2023.43
B (PEF Dispersion Constant)	17.5660	17.5660
C (PEF Dispersion Constant)	189.0426	189.0426
$F_n$ Unitless Dispersion Correction Factor	0.185837208	0.185837208
F(x) (function dependant on $U_{min}/U_0$ , derived using Cowherd et al. (1985))	0.194	0.194
$M_{moist}$ (Gravimetric soil moisture content) %	7.9	7.9
$M_{moist,av}$ (Gravimetric soil moisture content) %	12	12
$M_{wind}$ (dust emitted by wind erosion) g	51288.84717	51288.84717
$N_{dump}$ (number of times soil is dumped)	2	2
$N_{till}$ (number of times soil is tilled)	2	2
$Q/C_{ca}$ (inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source) $g/m^2$ -s per $kg/m^3$	14.31407	14.31407
$\rho_{soil}$ (density) $g/cm^3$ - chemical-specific	1.68	1.68
$s_{soil}$ (soil silt content) %	6.9	6.9
$AF_{cw}$ (skin adherence factor - construction worker) $mg/cm^2$	0.3	0.3
$AT_{cw}$ (averaging time - construction worker) days	365	365
$BW_{cw}$ (body weight - construction worker) kg	80	80
$ED_{cw}$ (exposure duration - construction worker) yr	1	1
$EF_{cw}$ (exposure frequency - construction worker) day/yr	250	250
$ET_{cw}$ (exposure time - construction worker) hr/day	8	8
THQ (target hazard quotient) unitless	0.1	0.1
$IRS_{cw}$ (soil ingestion rate - construction worker) mg/day	330	330
LT (lifetime) yr	70	70
$SA_{cw}$ (surface area - construction worker) $cm^2/day$	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
$S_{doz}$ (dozing speed) kph	11.4	11.4
$S_{grade}$ (grading speed) kph	11.4	11.4
$s_{soil}$ (soil silt content) %	18	18
$t_c$ (overall duration of construction) hours	8400	8400

# Site-specific Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
$T_c$ (overall duration of construction) s	30240000	30240000
T (time over which traffic occurs) s	7200000	7200000
$T_t$ (overall duration of traffic) s	7200000	7200000
$U_m$ (mean annual wind speed) m/s	4.69	4.69
$U_t$ (equivalent threshold value) m/s	11.32	11.32
V (fraction of vegetative cover)	0	0

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Aluminum	7429-90-5	No	No	Inorganics	-	-	-	-	1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-
Antimony (metallic)	7440-36-0	No	No	Inorganics	-	-	-	-	4.00E-04	P /Subchronic	-	-	0.15	-
Aroclor 1254	11097-69-1	No	Yes	Organics	2.00E+00	S	5.71E-04	S	3.00E-05	A /Subchronic	-	-	1	0.14
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03
Barium	7440-39-3	No	No	Inorganics	-	-	-	-	2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I /Chronic	2.00E-06	I /Chronic	1	0.13
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13
Cadmium (Diet)	7440-43-9	No	No	Inorganics	-	-	1.80E-03	I	5.00E-04	A /Subchronic	1.00E-05	A /Chronic	0.025	0.001
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-	-	-	-	1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13
Cobalt	7440-48-4	No	No	Inorganics	-	-	9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-



# Site-specific

## Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> (cm <sup>2</sup> /s)
1	-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
1	-	-	-	4.50E+01	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-
1	-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02
1	-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02
0.6	-	-	-	2.90E+01	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-
1	-	-	-	4.10E+01	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-
1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02
1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02
1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02
1	-	-	-	7.50E+01	-	-		1038.15	PHYSROP	2291	YAWS	INORGANIC	-
1	-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	3.61E+07	-	-	-	-	-	3.39E+04	-	7.58E+04	2.34E+04	2.34E+04 nc
-	-	3.61E+07	-	-	-	-	-	1.36E+01	-	-	1.36E+01	1.36E+01 nc
6.10E-06	1.87E-08	3.61E+07	1.83E+05	1.24E+01	2.76E+01	9.76E+01	7.86E+00	1.02E+00	2.27E+00	-	7.03E-01	7.03E-01 nc
5.61E-06	7.70E-09	3.61E+07	2.85E+05	1.24E+01	2.76E+01	1.52E+02	8.09E+00	-	-	-	-	8.09E+00 ca
-	-	3.61E+07	-	2.75E+01	1.72E+02	2.57E+03	2.35E+01	1.70E+01	1.06E+02	2.27E+02	1.37E+01	1.37E+01 nc
-	-	3.61E+07	-	-	-	-	-	6.79E+03	-	7.58E+04	6.23E+03	6.23E+03 nc
6.75E-06	6.83E-10	3.61E+07	9.57E+05	2.48E+02	5.94E+02	4.76E+03	1.69E+02	-	-	-	-	1.69E+02 ca
5.56E-06	-	3.61E+07	-	2.48E+01	5.94E+01	1.84E+04	1.75E+01	1.02E+01	2.44E+01	3.03E+01	5.81E+00	5.81E+00 nc
5.56E-06	-	3.61E+07	-	2.48E+02	5.94E+02	1.84E+05	1.75E+02	-	-	-	-	1.75E+02 ca
5.56E-06	-	3.61E+07	-	2.48E+03	5.94E+03	1.84E+06	1.75E+03	-	-	-	-	1.75E+03 ca
-	-	3.61E+07	-	-	-	6.15E+03	6.15E+03	1.70E+01	1.32E+02	1.52E+02	1.37E+01	1.37E+01 nc
-	-	3.61E+07	-	-	-	-	-	5.09E+04	-	7.58E+04	3.05E+04	3.05E+04 nc
6.75E-06	-	3.61E+07	-	2.48E+04	5.94E+04	1.84E+07	1.75E+04	-	-	-	-	1.75E+04 ca
-	-	3.61E+07	-	-	-	1.23E+03	1.23E+03	1.02E+02	-	3.03E+02	7.62E+01	7.62E+01 nc

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Copper	7440-50-8	No	No	Inorganics	-		-		1.00E-02	A /Subchronic	-		1	-
DDD, p,p'- (DDD)	72-54-8	No	No	Organics	2.40E-01	I	6.90E-05	C	3.00E-05	X /Subchronic	-		1	0.1
DDT	50-29-3	No	No	Organics	3.40E-01	I	9.70E-05	I	5.00E-04	A /Subchronic	-		1	0.03
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13
Endrin	72-20-8	No	No	Organics	-		-		3.00E-04	H /Subchronic	-		1	0.1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S /Chronic	5.00E-05	I /Chronic	0.04	-
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	H /Subchronic	1	-
Phenanthrene	85-01-8	No	Yes	Organics	-		-		-		-		1	0.13
Silver	7440-22-4	No	No	Inorganics	-		-		5.00E-03	H /Subchronic	-		0.04	-
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		5.00E-05	X /Subchronic	-		1	-
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		-		1.00E-02	A /Subchronic	1.00E-04	A /Chronic	0.026	-
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		-		3.00E-01	A /Subchronic	-		1	-

# Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

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RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> (cm <sup>2</sup> /s)
1	-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-
1	-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02
1	-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP	799.725		PEST	3.79E-02
1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
1	-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI	-		PEST	3.62E-02
1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
1	-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
1	-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP	869	YAWS	PAH	3.45E-02
1	-	-	-	8.30E+00	-	-		2273.15	PHYSPROP	6410	CRC89	INORGANIC	-
1	-	5.47E+04	-	-	-	-		-		-		INORGANIC	-
1	-	-	-	1.00E+03	-	-		3680.15	CRC89	11325	YAWS	INORGANIC	-
1	-	-	-	6.20E+01	-	-		1181.15	PHYSPROP	3170	YAWS	INORGANIC	-

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

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$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	3.61E+07	-	-	-	-	-	3.39E+02	-	-	3.39E+02	3.39E+02 nc
4.74E-06	-	3.61E+07	-	1.03E+02	3.22E+02	1.60E+05	7.81E+01	1.02E+00	3.18E+00	-	7.71E-01	7.71E-01 nc
4.43E-06	-	3.61E+07	-	7.29E+01	7.58E+02	1.14E+05	6.64E+01	1.70E+01	1.76E+02	-	1.55E+01	1.55E+01 nc
5.21E-06	-	3.61E+07	-	2.48E+01	5.94E+01	1.84E+04	1.75E+01	-	-	-	-	1.75E+01 ca
4.22E-06	-	3.61E+07	-	-	-	-	-	1.02E+01	3.18E+01	-	7.71E+00	7.71E+00 nc
5.23E-06	-	3.61E+07	-	2.48E+02	5.94E+02	1.84E+05	1.75E+02	-	-	-	-	1.75E+02 ca
-	-	3.61E+07	-	-	-	-	-	8.15E+02	-	7.58E+02	3.93E+02	3.93E+02 nc
6.30E-06	1.10E-05	3.61E+07	7.53E+03	-	-	-	-	-	-	9.49E-01	9.49E-01	9.49E-01 nc
6.69E-06	3.21E-08	3.61E+07	1.40E+05	-	-	-	-	-	-	-	-	-
-	-	3.61E+07	-	-	-	-	-	1.70E+02	-	-	1.70E+02	1.70E+02 nc
-	-	3.61E+07	-	-	-	-	-	1.70E+00	-	-	1.70E+00	1.70E+00 nc
-	-	3.61E+07	-	-	-	-	-	3.39E+02	-	1.52E+03	2.77E+02	2.77E+02 nc
-	-	3.61E+07	-	-	-	-	-	1.02E+04	-	-	1.02E+04	1.02E+04 nc

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aluminum	-	-	-	-	1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-	1
Antimony (metallic)	-	-	-	-	4.00E-04	P /Subchronic	-	-	0.15	-	1
Aroclor 1254	2.00E+00	S	5.71E-04	S	3.00E-05	A /Subchronic	-	-	1	0.14	1
Aroclor 1260	2.00E+00	S	5.71E-04	S	-	-	-	-	1	0.14	1
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03	0.6
Barium	-	-	-	-	2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-	1
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I /Chronic	2.00E-06	I /Chronic	1	0.13	1
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1
Cadmium (Diet)	-	-	1.80E-03	I	5.00E-04	A /Subchronic	1.00E-05	A /Chronic	0.025	0.001	1
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-	1
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1
Cobalt	-	-	9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-	1
Copper	-	-	-	-	1.00E-02	A /Subchronic	-	-	1	-	1
DDD, p,p'- (DDD)	2.40E-01	I	6.90E-05	C	3.00E-05	X /Subchronic	-	-	1	0.1	1
DDT	3.40E-01	I	9.70E-05	I	5.00E-04	A /Subchronic	-	-	1	0.03	1
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1
Endrin	-	-	-	-	3.00E-04	H /Subchronic	-	-	1	0.1	1
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1
Manganese (Non-diet)	-	-	-	-	2.40E-02	S /Chronic	5.00E-05	I /Chronic	0.04	-	1
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	H /Subchronic	1	-	1
Phenanthrene	-	-	-	-	-	-	-	-	1	0.13	1
Silver	-	-	-	-	5.00E-03	H /Subchronic	-	-	0.04	-	1
Thallium Sulfate	-	-	-	-	5.00E-05	X /Subchronic	-	-	1	-	1
Vanadium and Compounds	-	-	-	-	1.00E-02	A /Subchronic	1.00E-04	A /Chronic	0.026	-	1
Zinc and Compounds	-	-	-	-	3.00E-01	A /Subchronic	-	-	1	-	1
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>o</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref
Aluminum	-	-	-	1.50E+03	-	-	-	2792.15	CRC89
Antimony (metallic)	-	-	-	4.50E+01	-	-	-	1908.15	PHYSPROP
Aroclor 1254	-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI
Aroclor 1260	-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI
Arsenic, Inorganic	-	-	-	2.90E+01	-	-	-	888.15	PHYSPROP
Barium	-	-	-	4.10E+01	-	-	-	1873.15	PHYSPROP
Benz[a]anthracene	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP
Benzo[a]pyrene	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP
Benzo[b]fluoranthene	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI
Benzo[k]fluoranthene	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP
Cadmium (Diet)	-	-	-	7.50E+01	-	-	-	1038.15	PHYSPROP
Chromium(III), Insoluble Salts	-	-	-	1.80E+06	-	-	-	-	-
Chrysene	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP
Cobalt	-	-	-	4.50E+01	-	-	-	3200.15	CRC89
Copper	-	-	-	3.50E+01	-	-	-	2868.15	PHYSPROP
DDD, p,p'- (DDD)	-	9.00E-02	1.18E+05	-	6.60E-06	2.70E-04	PHYSPROP	623.15	PHYSPROP
DDT	-	5.50E-03	1.69E+05	-	8.32E-06	3.40E-04	PHYSPROP	533.15	PHYSPROP
Dibenz[a,h]anthracene	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP
Endrin	-	2.50E-01	2.01E+04	-	6.36E-06	2.60E-04	PHYSPROP	603.15	EPI
Indeno[1,2,3-cd]pyrene	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP
Manganese (Non-diet)	-	-	-	6.50E+01	-	-	-	2368.15	PHYSPROP
Mercury (elemental)	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP
Phenanthrene	-	1.15E+00	1.67E+04	1.00E+02	4.23E-05	1.73E-03	PHYSPROP	613.15	PHYSPROP
Silver	-	-	-	8.30E+00	-	-	-	2273.15	PHYSPROP
Thallium Sulfate	-	5.47E+04	-	-	-	-	-	-	-
Vanadium and Compounds	-	-	-	1.00E+03	-	-	-	3680.15	CRC89
Zinc and Compounds	-	-	-	6.20E+01	-	-	-	1181.15	PHYSPROP
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)
Aluminum	6700	CRC89	INORGANIC	-	-	-	3.61E+07	-
Antimony (metallic)	5070	YAWS	INORGANIC	-	-	-	3.61E+07	-
Aroclor 1254	957.225	Approx. from Tcrit=1.5xTBoil	PCB	2.37E-02	6.10E-06	1.87E-08	3.61E+07	1.83E+05
Aroclor 1260	987.225	Approx. from Tcrit=1.5xTBoil	PCB	2.20E-02	5.61E-06	7.70E-09	3.61E+07	2.85E+05
Arsenic, Inorganic	1673	CRC89	INORGANIC	-	-	-	3.61E+07	-
Barium	3572.13	YAWS	INORGANIC	-	-	-	3.61E+07	-
Benz[a]anthracene	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	3.61E+07	9.57E+05
Benzo[a]pyrene	-		PAH	4.76E-02	5.56E-06	-	3.61E+07	-
Benzo[b]fluoranthene	-		PAH	4.76E-02	5.56E-06	-	3.61E+07	-
Benzo[k]fluoranthene	-		PAH	4.76E-02	5.56E-06	-	3.61E+07	-
Cadmium (Diet)	2291	YAWS	INORGANIC	-	-	-	3.61E+07	-
Chromium(III), Insoluble Salts	-		INORGANIC	-	-	-	3.61E+07	-
Chrysene	979	YAWS	PAH	2.61E-02	6.75E-06	-	3.61E+07	-
Cobalt	7398.48	YAWS	INORGANIC	-	-	-	3.61E+07	-
Copper	5123	YAWS	INORGANIC	-	-	-	3.61E+07	-
DDD, p,p'- (DDD)	934.725	Approx. from Tcrit=1.5xTBoil	PEST	4.06E-02	4.74E-06	-	3.61E+07	-
DDT	799.725	Approx. from Tcrit=1.5xTBoil	PEST	3.79E-02	4.43E-06	-	3.61E+07	-
Dibenz[a,h]anthracene	-		PAH	4.46E-02	5.21E-06	-	3.61E+07	-
Endrin	-		PEST	3.62E-02	4.22E-06	-	3.61E+07	-
Indeno[1,2,3-cd]pyrene	-		PAH	4.48E-02	5.23E-06	-	3.61E+07	-
Manganese (Non-diet)	4325	CRC89	INORGANIC	-	-	-	3.61E+07	-
Mercury (elemental)	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	3.61E+07	7.53E+03
Phenanthrene	869	YAWS	PAH	3.45E-02	6.69E-06	3.21E-08	3.61E+07	1.40E+05
Silver	6410	CRC89	INORGANIC	-	-	-	3.61E+07	-
Thallium Sulfate	-		INORGANIC	-	-	-	3.61E+07	-
Vanadium and Compounds	11325	YAWS	INORGANIC	-	-	-	3.61E+07	-
Zinc and Compounds	3170	YAWS	INORGANIC	-	-	-	3.61E+07	-
<i>*Total Risk/HI</i>	-			-	-	-	-	-



# Construction Worker Risk for Soil - Other Construction Activities

Chemical	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	1.58E+04	-	-	-	-	4.66E-02	-	2.08E-02	6.74E-02
Antimony (metallic)	8.67E+00	-	-	-	-	6.39E-02	-	-	6.39E-02
Aroclor 1254	2.70E-01	2.18E-08	9.78E-09	2.77E-09	3.43E-08	2.65E-02	1.19E-02	-	3.84E-02
Aroclor 1260	1.32E-01	1.07E-08	4.78E-09	8.70E-10	1.63E-08	-	-	-	-
Arsenic, Inorganic	1.55E+01	5.62E-07	9.01E-08	6.01E-09	6.58E-07	9.12E-02	1.46E-02	6.80E-03	1.13E-01
Barium	5.87E+02	-	-	-	-	8.65E-03	-	7.74E-04	9.42E-03
Benz[a]anthracene	4.20E+00	1.70E-08	7.07E-09	8.82E-10	2.49E-08	-	-	-	-
Benzo[a]pyrene	3.55E+00	1.43E-07	5.97E-08	1.92E-10	2.03E-07	3.49E-02	1.45E-02	1.17E-02	6.11E-02
Benzo[b]fluoranthene	4.07E+00	1.64E-08	6.85E-09	2.21E-11	2.33E-08	-	-	-	-
Benzo[k]fluoranthene	1.93E+00	7.79E-10	3.25E-10	1.05E-12	1.10E-09	-	-	-	-
Cadmium (Diet)	5.86E+00	-	-	9.53E-10	9.53E-10	3.45E-02	4.43E-03	3.86E-03	4.28E-02
Chromium(III), Insoluble Salts	1.89E+02	-	-	-	-	3.71E-04	-	2.49E-04	6.21E-04
Chrysene	3.81E+00	1.54E-10	6.41E-11	2.07E-13	2.18E-10	-	-	-	-
Cobalt	4.81E+00	-	-	3.91E-09	3.91E-09	4.72E-03	-	1.59E-03	6.31E-03
Copper	7.43E+02	-	-	-	-	2.19E-01	-	-	2.19E-01
DDD, p,p'- (DDD)	4.43E+00	4.29E-08	1.38E-08	2.76E-11	5.67E-08	4.35E-01	1.40E-01	-	5.75E-01
DDT	1.29E+01	1.77E-07	1.70E-08	1.13E-10	1.94E-07	7.59E-02	7.30E-03	-	8.32E-02
Dibenz[a,h]anthracene	1.49E+00	6.01E-08	2.51E-08	8.08E-11	8.53E-08	-	-	-	-
Endrin	9.28E-01	-	-	-	-	9.11E-03	2.92E-03	-	1.20E-02
Indeno[1,2,3-cd]pyrene	2.50E+00	1.01E-08	4.21E-09	1.36E-11	1.43E-08	-	-	-	-
Manganese (Non-diet)	1.25E+03	-	-	-	-	1.53E-01	-	1.64E-01	3.17E-01
Mercury (elemental)	3.60E-01	-	-	-	-	-	-	3.79E-02	3.79E-02
Phenanthrene	1.04E+01	-	-	-	-	-	-	-	-
Silver	1.03E+01	-	-	-	-	6.08E-03	-	-	6.08E-03
Thallium Sulfate	2.27E+00	-	-	-	-	1.34E-01	-	-	1.34E-01
Vanadium and Compounds	2.06E+01	-	-	-	-	6.07E-03	-	1.36E-03	7.43E-03
Zinc and Compounds	1.24E+03	-	-	-	-	1.22E-02	-	-	1.22E-02
<b>*Total Risk/HI</b>	-	<b>1.06E-06</b>	<b>2.39E-07</b>	<b>1.58E-08</b>	<b>1.32E-06</b>	<b>1.36E+00</b>	<b>1.95E-01</b>	<b>2.49E-01</b>	<b>1.81E+00</b>

	A	B	C	D	E	F	G	H	I	J	K	L
1	<b>UCL Statistics for Data Sets with Non-Detects</b>											
2												
3	User Selected Options											
4	Date/Time of Computation		ProUCL 5.12/10/2020 7:18:52 PM									
5	From File		Area C_D_ss_prouclin.xls									
6	Full Precision		OFF									
7	Confidence Coefficient		95%									
8	Number of Bootstrap Operations		2000									
9												
10												
11	<b>Aluminum</b>											
12												
13	<b>General Statistics</b>											
14	Total Number of Observations				24		Number of Distinct Observations				23	
15							Number of Missing Observations				0	
16	Minimum				3670		Mean				15524	
17	Maximum				60500		Median				13150	
18	SD				11208		Std. Error of Mean				2288	
19	Coefficient of Variation				0.722		Skewness				2.913	
20												
21	<b>Normal GOF Test</b>											
22	Shapiro Wilk Test Statistic				0.713		<b>Shapiro Wilk GOF Test</b>					
23	5% Shapiro Wilk Critical Value				0.916		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.214		<b>Lilliefors GOF Test</b>					
25	5% Lilliefors Critical Value				0.177		Data Not Normal at 5% Significance Level					
26	<b>Data Not Normal at 5% Significance Level</b>											
27												
28	<b>Assuming Normal Distribution</b>											
29	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
30	95% Student's-t UCL				19445		95% Adjusted-CLT UCL (Chen-1995)				20740	
31							95% Modified-t UCL (Johnson-1978)				19671	
32												
33	<b>Gamma GOF Test</b>											
34	A-D Test Statistic				0.469		<b>Anderson-Darling Gamma GOF Test</b>					
35	5% A-D Critical Value				0.752		Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.143		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
37	5% K-S Critical Value				0.179		Detected data appear Gamma Distributed at 5% Significance Level					
38	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
39												
40	<b>Gamma Statistics</b>											
41	k hat (MLE)				2.899		k star (bias corrected MLE)				2.564	
42	Theta hat (MLE)				5355		Theta star (bias corrected MLE)				6053	
43	nu hat (MLE)				139.2		nu star (bias corrected)				123.1	
44	MLE Mean (bias corrected)				15524		MLE Sd (bias corrected)				9694	
45							Approximate Chi Square Value (0.05)				98.47	
46	Adjusted Level of Significance				0.0392		Adjusted Chi Square Value				96.92	
47												
48	<b>Assuming Gamma Distribution</b>											
49	95% Approximate Gamma UCL (use when n>=50)				19405		95% Adjusted Gamma UCL (use when n<50)				19715	
50												
51	<b>Lognormal GOF Test</b>											
52	Shapiro Wilk Test Statistic				0.957		<b>Shapiro Wilk Lognormal GOF Test</b>					
53	5% Shapiro Wilk Critical Value				0.916		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
54	Lilliefors Test Statistic					0.133	Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value					0.177	Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data					8.208	Mean of logged Data					9.468
60	Maximum of Logged Data					11.01	SD of logged Data					0.61
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL					20317	90% Chebyshev (MVUE) UCL					21552
64	95% Chebyshev (MVUE) UCL					24318	97.5% Chebyshev (MVUE) UCL					28158
65	99% Chebyshev (MVUE) UCL					35700						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL					19287	95% Jackknife UCL					19445
72	95% Standard Bootstrap UCL					19140	95% Bootstrap-t UCL					22121
73	95% Hall's Bootstrap UCL					36807	95% Percentile Bootstrap UCL					19429
74	95% BCA Bootstrap UCL					21048						
75	90% Chebyshev(Mean, Sd) UCL					22387	95% Chebyshev(Mean, Sd) UCL					25496
76	97.5% Chebyshev(Mean, Sd) UCL					29811	99% Chebyshev(Mean, Sd) UCL					38287
77												
78	Suggested UCL to Use											
79	95% Adjusted Gamma UCL					19715						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												
86	Antimony											
87												
88	General Statistics											
89	Total Number of Observations					12	Number of Distinct Observations					12
90	Number of Detects					10	Number of Non-Detects					2
91	Number of Distinct Detects					10	Number of Distinct Non-Detects					2
92	Minimum Detect					1.2	Minimum Non-Detect					6.8
93	Maximum Detect					6.1	Maximum Non-Detect					7.6
94	Variance Detects					3.285	Percent Non-Detects					16.67%
95	Mean Detects					3.41	SD Detects					1.813
96	Median Detects					3.1	CV Detects					0.532
97	Skewness Detects					0.384	Kurtosis Detects					-1.416
98	Mean of Logged Detects					1.085	SD of Logged Detects					0.578
99												
100	Normal GOF Test on Detects Only											
101	Shapiro Wilk Test Statistic					0.917	Shapiro Wilk GOF Test					
102	5% Shapiro Wilk Critical Value					0.842	Detected Data appear Normal at 5% Significance Level					
103	Lilliefors Test Statistic					0.165	Lilliefors GOF Test					
104	5% Lilliefors Critical Value					0.262	Detected Data appear Normal at 5% Significance Level					
105	Detected Data appear Normal at 5% Significance Level											
106												

	A	B	C	D	E	F	G	H	I	J	K	L	
107	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
108	KM Mean				3.41	KM Standard Error of Mean				0.573			
109	KM SD				1.72	95% KM (BCA) UCL				4.35			
110	95% KM (t) UCL				4.439	95% KM (Percentile Bootstrap) UCL				4.35			
111	95% KM (z) UCL				4.353	95% KM Bootstrap t UCL				4.606			
112	90% KM Chebyshev UCL				5.13	95% KM Chebyshev UCL				5.908			
113	97.5% KM Chebyshev UCL				6.99	99% KM Chebyshev UCL				9.113			
114													
115	<b>Gamma GOF Tests on Detected Observations Only</b>												
116	A-D Test Statistic				0.275	<b>Anderson-Darling GOF Test</b>							
117	5% A-D Critical Value				0.73	Detected data appear Gamma Distributed at 5% Significance Level							
118	K-S Test Statistic				0.152	<b>Kolmogorov-Smirnov GOF</b>							
119	5% K-S Critical Value				0.268	Detected data appear Gamma Distributed at 5% Significance Level							
120	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
121													
122	<b>Gamma Statistics on Detected Data Only</b>												
123	k hat (MLE)				3.696	k star (bias corrected MLE)				2.654			
124	Theta hat (MLE)				0.923	Theta star (bias corrected MLE)				1.285			
125	nu hat (MLE)				73.92	nu star (bias corrected)				53.08			
126	Mean (detects)				3.41								
127													
128	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
129	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
130	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
131	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
132	This is especially true when the sample size is small.												
133	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
134	Minimum				1.2	Mean				3.371			
135	Maximum				6.1	Median				3.174			
136	SD				1.642	CV				0.487			
137	k hat (MLE)				4.392	k star (bias corrected MLE)				3.35			
138	Theta hat (MLE)				0.767	Theta star (bias corrected MLE)				1.006			
139	nu hat (MLE)				105.4	nu star (bias corrected)				80.39			
140	Adjusted Level of Significance ( $\beta$ )				0.029								
141	Approximate Chi Square Value (80.39, $\alpha$ )				60.73	Adjusted Chi Square Value (80.39, $\beta$ )				58.13			
142	95% Gamma Approximate UCL (use when $n \geq 50$ )				4.462	95% Gamma Adjusted UCL (use when $n < 50$ )				4.662			
143													
144	<b>Estimates of Gamma Parameters using KM Estimates</b>												
145	Mean (KM)				3.41	SD (KM)				1.72			
146	Variance (KM)				2.957	SE of Mean (KM)				0.573			
147	k hat (KM)				3.933	k star (KM)				3.005			
148	nu hat (KM)				94.38	nu star (KM)				72.12			
149	theta hat (KM)				0.867	theta star (KM)				1.135			
150	80% gamma percentile (KM)				4.863	90% gamma percentile (KM)				6.048			
151	95% gamma percentile (KM)				7.153	99% gamma percentile (KM)				9.549			
152													
153	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
154	Approximate Chi Square Value (72.12, $\alpha$ )				53.56	Adjusted Chi Square Value (72.12, $\beta$ )				51.13			
155	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				4.591	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				4.81			
156													
157	<b>Lognormal GOF Test on Detected Observations Only</b>												
158	Shapiro Wilk Test Statistic				0.942	<b>Shapiro Wilk GOF Test</b>							
159	5% Shapiro Wilk Critical Value				0.842	Detected Data appear Lognormal at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L
160	Lilliefors Test Statistic					0.127	Lilliefors GOF Test					
161	5% Lilliefors Critical Value					0.262	Detected Data appear Lognormal at 5% Significance Level					
162	Detected Data appear Lognormal at 5% Significance Level											
163												
164	Lognormal ROS Statistics Using Imputed Non-Detects											
165	Mean in Original Scale					3.335	Mean in Log Scale					1.085
166	SD in Original Scale					1.649	SD in Log Scale					0.523
167	95% t UCL (assumes normality of ROS data)					4.19	95% Percentile Bootstrap UCL					4.135
168	95% BCA Bootstrap UCL					4.205	95% Bootstrap t UCL					4.265
169	95% H-UCL (Log ROS)					4.777						
170												
171	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
172	KM Mean (logged)					1.085	KM Geo Mean					2.961
173	KM SD (logged)					0.548	95% Critical H Value (KM-Log)					2.202
174	KM Standard Error of Mean (logged)					0.183	95% H-UCL (KM -Log)					4.95
175	KM SD (logged)					0.548	95% Critical H Value (KM-Log)					2.202
176	KM Standard Error of Mean (logged)					0.183						
177												
178	DL/2 Statistics											
179	DL/2 Normal						DL/2 Log-Transformed					
180	Mean in Original Scale					3.442	Mean in Log Scale					1.118
181	SD in Original Scale					1.643	SD in Log Scale					0.529
182	95% t UCL (Assumes normality)					4.294	95% H-Stat UCL					4.974
183	DL/2 is not a recommended method, provided for comparisons and historical reasons											
184												
185	Nonparametric Distribution Free UCL Statistics											
186	Detected Data appear Normal Distributed at 5% Significance Level											
187												
188	Suggested UCL to Use											
189	95% KM (t) UCL					4.439						
190												
191	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
192	Recommendations are based upon data size, data distribution, and skewness.											
193	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
194	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
195												
196												
197	Arsenic											
198												
199	General Statistics											
200	Total Number of Observations					23	Number of Distinct Observations					22
201							Number of Missing Observations					0
202	Minimum					3.5	Mean					11.78
203	Maximum					31.6	Median					10.1
204	SD					6.294	Std. Error of Mean					1.312
205	Coefficient of Variation					0.534	Skewness					1.501
206												
207	Normal GOF Test											
208	Shapiro Wilk Test Statistic					0.881	Shapiro Wilk GOF Test					
209	5% Shapiro Wilk Critical Value					0.914	Data Not Normal at 5% Significance Level					
210	Lilliefors Test Statistic					0.158	Lilliefors GOF Test					
211	5% Lilliefors Critical Value					0.18	Data appear Normal at 5% Significance Level					
212	Data appear Approximate Normal at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L	
213													
214	<b>Assuming Normal Distribution</b>												
215	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
216	95% Student's-t UCL					14.04	95% Adjusted-CLT UCL (Chen-1995)					14.38	
217							95% Modified-t UCL (Johnson-1978)					14.1	
218													
219	<b>Gamma GOF Test</b>												
220	A-D Test Statistic				0.277	<b>Anderson-Darling Gamma GOF Test</b>							
221	5% A-D Critical Value				0.748	Detected data appear Gamma Distributed at 5% Significance Level							
222	K-S Test Statistic				0.111	<b>Kolmogorov-Smirnov Gamma GOF Test</b>							
223	5% K-S Critical Value				0.182	Detected data appear Gamma Distributed at 5% Significance Level							
224	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
225													
226	<b>Gamma Statistics</b>												
227	k hat (MLE)				4.252	k star (bias corrected MLE)				3.726			
228	Theta hat (MLE)				2.771	Theta star (bias corrected MLE)				3.162			
229	nu hat (MLE)				195.6	nu star (bias corrected)				171.4			
230	MLE Mean (bias corrected)				11.78	MLE Sd (bias corrected)				6.104			
231						Approximate Chi Square Value (0.05)					142.1		
232	Adjusted Level of Significance				0.0389	Adjusted Chi Square Value				140.2			
233													
234	<b>Assuming Gamma Distribution</b>												
235	95% Approximate Gamma UCL (use when n>=50))				14.21	95% Adjusted Gamma UCL (use when n<50)				14.41			
236													
237	<b>Lognormal GOF Test</b>												
238	Shapiro Wilk Test Statistic				0.987	<b>Shapiro Wilk Lognormal GOF Test</b>							
239	5% Shapiro Wilk Critical Value				0.914	Data appear Lognormal at 5% Significance Level							
240	Lilliefors Test Statistic				0.0919	<b>Lilliefors Lognormal GOF Test</b>							
241	5% Lilliefors Critical Value				0.18	Data appear Lognormal at 5% Significance Level							
242	<b>Data appear Lognormal at 5% Significance Level</b>												
243													
244	<b>Lognormal Statistics</b>												
245	Minimum of Logged Data				1.253	Mean of logged Data				2.344			
246	Maximum of Logged Data				3.453	SD of logged Data				0.504			
247													
248	<b>Assuming Lognormal Distribution</b>												
249	95% H-UCL				14.63	90% Chebyshev (MVUE) UCL				15.62			
250	95% Chebyshev (MVUE) UCL				17.37	97.5% Chebyshev (MVUE) UCL				19.79			
251	99% Chebyshev (MVUE) UCL				24.55								
252													
253	<b>Nonparametric Distribution Free UCL Statistics</b>												
254	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
255													
256	<b>Nonparametric Distribution Free UCLs</b>												
257	95% CLT UCL				13.94	95% Jackknife UCL				14.04			
258	95% Standard Bootstrap UCL				13.91	95% Bootstrap-t UCL				14.65			
259	95% Hall's Bootstrap UCL				15.09	95% Percentile Bootstrap UCL				13.97			
260	95% BCA Bootstrap UCL				14.35								
261	90% Chebyshev(Mean, Sd) UCL				15.72	95% Chebyshev(Mean, Sd) UCL				17.5			
262	97.5% Chebyshev(Mean, Sd) UCL				19.98	99% Chebyshev(Mean, Sd) UCL				24.84			
263													
264	<b>Suggested UCL to Use</b>												
265	95% Student's-t UCL				14.04								

	A	B	C	D	E	F	G	H	I	J	K	L
266												
267	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
268	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
269												
270	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
271	Recommendations are based upon data size, data distribution, and skewness.											
272	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
273	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
274												
275												
276	<b>Barium</b>											
277												
278	<b>General Statistics</b>											
279	Total Number of Observations				24		Number of Distinct Observations				24	
280							Number of Missing Observations				0	
281	Minimum				36		Mean				289.8	
282	Maximum				879		Median				243.5	
283	SD				198.9		Std. Error of Mean				40.6	
284	Coefficient of Variation				0.686		Skewness				1.916	
285												
286	<b>Normal GOF Test</b>											
287	Shapiro Wilk Test Statistic				0.792		<b>Shapiro Wilk GOF Test</b>					
288	5% Shapiro Wilk Critical Value				0.916		Data Not Normal at 5% Significance Level					
289	Lilliefors Test Statistic				0.214		<b>Lilliefors GOF Test</b>					
290	5% Lilliefors Critical Value				0.177		Data Not Normal at 5% Significance Level					
291	<b>Data Not Normal at 5% Significance Level</b>											
292												
293	<b>Assuming Normal Distribution</b>											
294	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
295	95% Student's-t UCL				359.3		95% Adjusted-CLT UCL (Chen-1995)				373.5	
296							95% Modified-t UCL (Johnson-1978)				362	
297												
298	<b>Gamma GOF Test</b>											
299	A-D Test Statistic				0.569		<b>Anderson-Darling Gamma GOF Test</b>					
300	5% A-D Critical Value				0.752		Detected data appear Gamma Distributed at 5% Significance Level					
301	K-S Test Statistic				0.134		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
302	5% K-S Critical Value				0.179		Detected data appear Gamma Distributed at 5% Significance Level					
303	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
304												
305	<b>Gamma Statistics</b>											
306	k hat (MLE)				2.724		k star (bias corrected MLE)				2.411	
307	Theta hat (MLE)				106.4		Theta star (bias corrected MLE)				120.2	
308	nu hat (MLE)				130.7		nu star (bias corrected)				115.7	
309	MLE Mean (bias corrected)				289.8		MLE Sd (bias corrected)				186.6	
310							Approximate Chi Square Value (0.05)				91.89	
311	Adjusted Level of Significance				0.0392		Adjusted Chi Square Value				90.4	
312												
313	<b>Assuming Gamma Distribution</b>											
314	95% Approximate Gamma UCL (use when n>=50)				364.9		95% Adjusted Gamma UCL (use when n<50)				370.9	
315												
316	<b>Lognormal GOF Test</b>											
317	Shapiro Wilk Test Statistic				0.939		<b>Shapiro Wilk Lognormal GOF Test</b>					
318	5% Shapiro Wilk Critical Value				0.916		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
319	Lilliefors Test Statistic					0.122	Lilliefors Lognormal GOF Test					
320	5% Lilliefors Critical Value					0.177	Data appear Lognormal at 5% Significance Level					
321	Data appear Lognormal at 5% Significance Level											
322												
323	Lognormal Statistics											
324	Minimum of Logged Data					3.584	Mean of logged Data					5.474
325	Maximum of Logged Data					6.779	SD of logged Data					0.656
326												
327	Assuming Lognormal Distribution											
328	95% H-UCL					396	90% Chebyshev (MVUE) UCL					418.1
329	95% Chebyshev (MVUE) UCL					474.9	97.5% Chebyshev (MVUE) UCL					553.7
330	99% Chebyshev (MVUE) UCL					708.6						
331												
332	Nonparametric Distribution Free UCL Statistics											
333	Data appear to follow a Discernible Distribution at 5% Significance Level											
334												
335	Nonparametric Distribution Free UCLs											
336	95% CLT UCL					356.5	95% Jackknife UCL					359.3
337	95% Standard Bootstrap UCL					354.6	95% Bootstrap-t UCL					405
338	95% Hall's Bootstrap UCL					674.1	95% Percentile Bootstrap UCL					357.3
339	95% BCA Bootstrap UCL					373.5						
340	90% Chebyshev(Mean, Sd) UCL					411.5	95% Chebyshev(Mean, Sd) UCL					466.7
341	97.5% Chebyshev(Mean, Sd) UCL					543.3	99% Chebyshev(Mean, Sd) UCL					693.7
342												
343	Suggested UCL to Use											
344	95% Adjusted Gamma UCL					370.9						
345												
346	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
347	Recommendations are based upon data size, data distribution, and skewness.											
348	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
349	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
350												
351												
352	Cadmium											
353												
354	General Statistics											
355	Total Number of Observations					24	Number of Distinct Observations					24
356							Number of Missing Observations					0
357	Minimum					0.3	Mean					3.548
358	Maximum					24	Median					1.75
359	SD					5.949	Std. Error of Mean					1.214
360	Coefficient of Variation					1.677	Skewness					3.095
361												
362	Normal GOF Test											
363	Shapiro Wilk Test Statistic					0.474	Shapiro Wilk GOF Test					
364	5% Shapiro Wilk Critical Value					0.916	Data Not Normal at 5% Significance Level					
365	Lilliefors Test Statistic					0.423	Lilliefors GOF Test					
366	5% Lilliefors Critical Value					0.177	Data Not Normal at 5% Significance Level					
367	Data Not Normal at 5% Significance Level											
368												
369	Assuming Normal Distribution											
370	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
371	95% Student's-t UCL					5.63	95% Adjusted-CLT UCL (Chen-1995)					6.366



	A	B	C	D	E	F	G	H	I	J	K	L
372							95% Modified-t UCL (Johnson-1978)					5.757
373												
374	<b>Gamma GOF Test</b>											
375	A-D Test Statistic				2.068	<b>Anderson-Darling Gamma GOF Test</b>						
376	5% A-D Critical Value				0.775	Data Not Gamma Distributed at 5% Significance Level						
377	K-S Test Statistic				0.289	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
378	5% K-S Critical Value				0.184	Data Not Gamma Distributed at 5% Significance Level						
379	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
380												
381	<b>Gamma Statistics</b>											
382	k hat (MLE)				0.928	k star (bias corrected MLE)					0.84	
383	Theta hat (MLE)				3.822	Theta star (bias corrected MLE)					4.224	
384	nu hat (MLE)				44.56	nu star (bias corrected)					40.32	
385	MLE Mean (bias corrected)				3.548	MLE Sd (bias corrected)					3.871	
386						Approximate Chi Square Value (0.05)					26.77	
387	Adjusted Level of Significance				0.0392	Adjusted Chi Square Value					26	
388												
389	<b>Assuming Gamma Distribution</b>											
390	95% Approximate Gamma UCL (use when n>=50))				5.344	95% Adjusted Gamma UCL (use when n<50)					5.504	
391												
392	<b>Lognormal GOF Test</b>											
393	Shapiro Wilk Test Statistic				0.911	<b>Shapiro Wilk Lognormal GOF Test</b>						
394	5% Shapiro Wilk Critical Value				0.916	Data Not Lognormal at 5% Significance Level						
395	Lilliefors Test Statistic				0.189	<b>Lilliefors Lognormal GOF Test</b>						
396	5% Lilliefors Critical Value				0.177	Data Not Lognormal at 5% Significance Level						
397	<b>Data Not Lognormal at 5% Significance Level</b>											
398												
399	<b>Lognormal Statistics</b>											
400	Minimum of Logged Data				-1.204	Mean of logged Data					0.639	
401	Maximum of Logged Data				3.178	SD of logged Data					0.994	
402												
403	<b>Assuming Lognormal Distribution</b>											
404	95% H-UCL				5.253	90% Chebyshev (MVUE) UCL					5.097	
405	95% Chebyshev (MVUE) UCL				6.039	97.5% Chebyshev (MVUE) UCL					7.347	
406	99% Chebyshev (MVUE) UCL				9.916							
407												
408	<b>Nonparametric Distribution Free UCL Statistics</b>											
409	<b>Data do not follow a Discernible Distribution (0.05)</b>											
410												
411	<b>Nonparametric Distribution Free UCLs</b>											
412	95% CLT UCL				5.546	95% Jackknife UCL					5.63	
413	95% Standard Bootstrap UCL				5.542	95% Bootstrap-t UCL					14.21	
414	95% Hall's Bootstrap UCL				17.99	95% Percentile Bootstrap UCL					5.615	
415	95% BCA Bootstrap UCL				6.462							
416	90% Chebyshev(Mean, Sd) UCL				7.191	95% Chebyshev(Mean, Sd) UCL					8.842	
417	97.5% Chebyshev(Mean, Sd) UCL				11.13	99% Chebyshev(Mean, Sd) UCL					15.63	
418												
419	<b>Suggested UCL to Use</b>											
420	95% Chebyshev (Mean, Sd) UCL				8.842							
421												
422	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
423	Recommendations are based upon data size, data distribution, and skewness.											
424	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											

	A	B	C	D	E	F	G	H	I	J	K	L
425	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
426												
427												
428	<b>Chromium</b>											
429												
430	<b>General Statistics</b>											
431	Total Number of Observations				24		Number of Distinct Observations				23	
432							Number of Missing Observations				0	
433	Minimum				8.1		Mean				90.84	
434	Maximum				637		Median				48.1	
435	SD				164.4		Std. Error of Mean				33.55	
436	Coefficient of Variation				1.809		Skewness				3.105	
437												
438	<b>Normal GOF Test</b>											
439	Shapiro Wilk Test Statistic				0.45		<b>Shapiro Wilk GOF Test</b>					
440	5% Shapiro Wilk Critical Value				0.916		Data Not Normal at 5% Significance Level					
441	Lilliefors Test Statistic				0.396		<b>Lilliefors GOF Test</b>					
442	5% Lilliefors Critical Value				0.177		Data Not Normal at 5% Significance Level					
443	<b>Data Not Normal at 5% Significance Level</b>											
444												
445	<b>Assuming Normal Distribution</b>											
446	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
447	95% Student's-t UCL				148.3		95% Adjusted-CLT UCL (Chen-1995)				168.8	
448							95% Modified-t UCL (Johnson-1978)				151.9	
449												
450	<b>Gamma GOF Test</b>											
451	A-D Test Statistic				2.384		<b>Anderson-Darling Gamma GOF Test</b>					
452	5% A-D Critical Value				0.779		Data Not Gamma Distributed at 5% Significance Level					
453	K-S Test Statistic				0.299		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
454	5% K-S Critical Value				0.184		Data Not Gamma Distributed at 5% Significance Level					
455	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
456												
457	<b>Gamma Statistics</b>											
458	k hat (MLE)				0.835		k star (bias corrected MLE)				0.758	
459	Theta hat (MLE)				108.8		Theta star (bias corrected MLE)				119.8	
460	nu hat (MLE)				40.08		nu star (bias corrected)				36.4	
461	MLE Mean (bias corrected)				90.84		MLE Sd (bias corrected)				104.3	
462							Approximate Chi Square Value (0.05)				23.59	
463	Adjusted Level of Significance				0.0392		Adjusted Chi Square Value				22.86	
464												
465	<b>Assuming Gamma Distribution</b>											
466	95% Approximate Gamma UCL (use when n>=50))				140.2		95% Adjusted Gamma UCL (use when n<50)				144.6	
467												
468	<b>Lognormal GOF Test</b>											
469	Shapiro Wilk Test Statistic				0.893		<b>Shapiro Wilk Lognormal GOF Test</b>					
470	5% Shapiro Wilk Critical Value				0.916		Data Not Lognormal at 5% Significance Level					
471	Lilliefors Test Statistic				0.194		<b>Lilliefors Lognormal GOF Test</b>					
472	5% Lilliefors Critical Value				0.177		Data Not Lognormal at 5% Significance Level					
473	<b>Data Not Lognormal at 5% Significance Level</b>											
474												
475	<b>Lognormal Statistics</b>											
476	Minimum of Logged Data				2.092		Mean of logged Data				3.802	
477	Maximum of Logged Data				6.457		SD of logged Data				1.038	

	A	B	C	D	E	F	G	H	I	J	K	L	
478													
479	<b>Assuming Lognormal Distribution</b>												
480	95% H-UCL				134.7					90% Chebyshev (MVUE) UCL			128.3
481	95% Chebyshev (MVUE) UCL				152.8					97.5% Chebyshev (MVUE) UCL			186.7
482	99% Chebyshev (MVUE) UCL				253.3								
483													
484	<b>Nonparametric Distribution Free UCL Statistics</b>												
485	<b>Data do not follow a Discernible Distribution (0.05)</b>												
486													
487	<b>Nonparametric Distribution Free UCLs</b>												
488	95% CLT UCL				146					95% Jackknife UCL			148.3
489	95% Standard Bootstrap UCL				144.8					95% Bootstrap-t UCL			438.3
490	95% Hall's Bootstrap UCL				483.7					95% Percentile Bootstrap UCL			146.4
491	95% BCA Bootstrap UCL				169.2								
492	90% Chebyshev(Mean, Sd) UCL				191.5					95% Chebyshev(Mean, Sd) UCL			237.1
493	97.5% Chebyshev(Mean, Sd) UCL				300.4					99% Chebyshev(Mean, Sd) UCL			424.7
494													
495	<b>Suggested UCL to Use</b>												
496	95% Chebyshev (Mean, Sd) UCL				237.1								
497													
498	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
499	Recommendations are based upon data size, data distribution, and skewness.												
500	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
501	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
502													
503													
504	<b>Cobalt</b>												
505													
506	<b>General Statistics</b>												
507	Total Number of Observations				23					Number of Distinct Observations			21
508										Number of Missing Observations			0
509	Minimum				1.6					Mean			4.157
510	Maximum				7					Median			4.1
511	SD				1.573					Std. Error of Mean			0.328
512	Coefficient of Variation				0.378					Skewness			0.0914
513													
514	<b>Normal GOF Test</b>												
515	Shapiro Wilk Test Statistic				0.963					<b>Shapiro Wilk GOF Test</b>			
516	5% Shapiro Wilk Critical Value				0.914					Data appear Normal at 5% Significance Level			
517	Lilliefors Test Statistic				0.108					<b>Lilliefors GOF Test</b>			
518	5% Lilliefors Critical Value				0.18					Data appear Normal at 5% Significance Level			
519	<b>Data appear Normal at 5% Significance Level</b>												
520													
521	<b>Assuming Normal Distribution</b>												
522	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
523	95% Student's-t UCL				4.72					95% Adjusted-CLT UCL (Chen-1995)			4.703
524										95% Modified-t UCL (Johnson-1978)			4.721
525													
526	<b>Gamma GOF Test</b>												
527	A-D Test Statistic				0.347					<b>Anderson-Darling Gamma GOF Test</b>			
528	5% A-D Critical Value				0.746					Detected data appear Gamma Distributed at 5% Significance Level			
529	K-S Test Statistic				0.115					<b>Kolmogorov-Smirnov Gamma GOF Test</b>			
530	5% K-S Critical Value				0.182					Detected data appear Gamma Distributed at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L	
531	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
532													
533	<b>Gamma Statistics</b>												
534	k hat (MLE)				6.575		k star (bias corrected MLE)				5.746		
535	Theta hat (MLE)				0.632		Theta star (bias corrected MLE)				0.723		
536	nu hat (MLE)				302.4		nu star (bias corrected)				264.3		
537	MLE Mean (bias corrected)				4.157		MLE Sd (bias corrected)				1.734		
538									Approximate Chi Square Value (0.05)				227.7
539	Adjusted Level of Significance				0.0389						Adjusted Chi Square Value		225.2
540													
541	<b>Assuming Gamma Distribution</b>												
542	95% Approximate Gamma UCL (use when n>=50))				4.826		95% Adjusted Gamma UCL (use when n<50)				4.878		
543													
544	<b>Lognormal GOF Test</b>												
545	Shapiro Wilk Test Statistic				0.947		<b>Shapiro Wilk Lognormal GOF Test</b>						
546	5% Shapiro Wilk Critical Value				0.914		Data appear Lognormal at 5% Significance Level						
547	Lilliefors Test Statistic				0.122		<b>Lilliefors Lognormal GOF Test</b>						
548	5% Lilliefors Critical Value				0.18		Data appear Lognormal at 5% Significance Level						
549	<b>Data appear Lognormal at 5% Significance Level</b>												
550													
551	<b>Lognormal Statistics</b>												
552	Minimum of Logged Data				0.47		Mean of logged Data				1.347		
553	Maximum of Logged Data				1.946		SD of logged Data				0.42		
554													
555	<b>Assuming Lognormal Distribution</b>												
556	95% H-UCL				4.981		90% Chebyshev (MVUE) UCL				5.312		
557	95% Chebyshev (MVUE) UCL				5.824		97.5% Chebyshev (MVUE) UCL				6.534		
558	99% Chebyshev (MVUE) UCL				7.93								
559													
560	<b>Nonparametric Distribution Free UCL Statistics</b>												
561	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
562													
563	<b>Nonparametric Distribution Free UCLs</b>												
564	95% CLT UCL				4.696		95% Jackknife UCL				4.72		
565	95% Standard Bootstrap UCL				4.68		95% Bootstrap-t UCL				4.714		
566	95% Hall's Bootstrap UCL				4.68		95% Percentile Bootstrap UCL				4.709		
567	95% BCA Bootstrap UCL				4.696								
568	90% Chebyshev(Mean, Sd) UCL				5.141		95% Chebyshev(Mean, Sd) UCL				5.586		
569	97.5% Chebyshev(Mean, Sd) UCL				6.205		99% Chebyshev(Mean, Sd) UCL				7.42		
570													
571	<b>Suggested UCL to Use</b>												
572	95% Student's-t UCL				4.72								
573													
574	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
575	Recommendations are based upon data size, data distribution, and skewness.												
576	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
577	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
578													
579													
580	<b>Copper</b>												
581													
582	<b>General Statistics</b>												
583	Total Number of Observations				24		Number of Distinct Observations				24		

	A	B	C	D	E	F	G	H	I	J	K	L
584	Number of Missing Observations											0
585	Minimum					36.4	Mean					418.2
586	Maximum					2740	Median					172.5
587	SD					641.6	Std. Error of Mean					131
588	Coefficient of Variation					1.534	Skewness					2.76
589	<b>Normal GOF Test</b>											
590	<b>Normal GOF Test</b>											
591	Shapiro Wilk Test Statistic					0.566	<b>Shapiro Wilk GOF Test</b>					
592	5% Shapiro Wilk Critical Value					0.916	Data Not Normal at 5% Significance Level					
593	Lilliefors Test Statistic					0.359	<b>Lilliefors GOF Test</b>					
594	5% Lilliefors Critical Value					0.177	Data Not Normal at 5% Significance Level					
595	<b>Data Not Normal at 5% Significance Level</b>											
596												
597	<b>Assuming Normal Distribution</b>											
598	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
599	95% Student's-t UCL					642.7	95% Adjusted-CLT UCL (Chen-1995)					712.5
600							95% Modified-t UCL (Johnson-1978)					655
601												
602	<b>Gamma GOF Test</b>											
603	A-D Test Statistic					1.694	<b>Anderson-Darling Gamma GOF Test</b>					
604	5% A-D Critical Value					0.776	Data Not Gamma Distributed at 5% Significance Level					
605	K-S Test Statistic					0.23	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
606	5% K-S Critical Value					0.184	Data Not Gamma Distributed at 5% Significance Level					
607	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
608												
609	<b>Gamma Statistics</b>											
610	k hat (MLE)					0.897	k star (bias corrected MLE)					0.813
611	Theta hat (MLE)					466.3	Theta star (bias corrected MLE)					514.7
612	nu hat (MLE)					43.05	nu star (bias corrected)					39
613	MLE Mean (bias corrected)					418.2	MLE Sd (bias corrected)					464
614							Approximate Chi Square Value (0.05)					25.7
615	Adjusted Level of Significance					0.0392	Adjusted Chi Square Value					24.94
616												
617	<b>Assuming Gamma Distribution</b>											
618	95% Approximate Gamma UCL (use when n>=50))					634.8	95% Adjusted Gamma UCL (use when n<50)					654.1
619												
620	<b>Lognormal GOF Test</b>											
621	Shapiro Wilk Test Statistic					0.934	<b>Shapiro Wilk Lognormal GOF Test</b>					
622	5% Shapiro Wilk Critical Value					0.916	Data appear Lognormal at 5% Significance Level					
623	Lilliefors Test Statistic					0.137	<b>Lilliefors Lognormal GOF Test</b>					
624	5% Lilliefors Critical Value					0.177	Data appear Lognormal at 5% Significance Level					
625	<b>Data appear Lognormal at 5% Significance Level</b>											
626												
627	<b>Lognormal Statistics</b>											
628	Minimum of Logged Data					3.595	Mean of logged Data					5.384
629	Maximum of Logged Data					7.916	SD of logged Data					1.065
630												
631	<b>Assuming Lognormal Distribution</b>											
632	95% H-UCL					688.6	90% Chebyshev (MVUE) UCL					648.3
633	95% Chebyshev (MVUE) UCL					774	97.5% Chebyshev (MVUE) UCL					948.4
634	99% Chebyshev (MVUE) UCL					1291						
635												
636	<b>Nonparametric Distribution Free UCL Statistics</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
637	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
638												
639	<b>Nonparametric Distribution Free UCLs</b>											
640	95% CLT UCL				633.7		95% Jackknife UCL				642.7	
641	95% Standard Bootstrap UCL				625.6		95% Bootstrap-t UCL				837.4	
642	95% Hall's Bootstrap UCL				670		95% Percentile Bootstrap UCL				657.9	
643	95% BCA Bootstrap UCL				739.6							
644	90% Chebyshev(Mean, Sd) UCL				811.1		95% Chebyshev(Mean, Sd) UCL				989.1	
645	97.5% Chebyshev(Mean, Sd) UCL				1236		99% Chebyshev(Mean, Sd) UCL				1721	
646												
647	<b>Suggested UCL to Use</b>											
648	95% Chebyshev (Mean, Sd) UCL				989.1							
649												
650	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
651	Recommendations are based upon data size, data distribution, and skewness.											
652	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
653	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
654												
655												
656	<b>Lead</b>											
657												
658	<b>General Statistics</b>											
659	Total Number of Observations				24		Number of Distinct Observations				23	
660							Number of Missing Observations				0	
661	Minimum				64.4		Mean				330.9	
662	Maximum				1020		Median				245.5	
663	SD				278		Std. Error of Mean				56.74	
664	Coefficient of Variation				0.84		Skewness				1.298	
665												
666	<b>Normal GOF Test</b>											
667	Shapiro Wilk Test Statistic				0.829		<b>Shapiro Wilk GOF Test</b>					
668	5% Shapiro Wilk Critical Value				0.916		Data Not Normal at 5% Significance Level					
669	Lilliefors Test Statistic				0.188		<b>Lilliefors GOF Test</b>					
670	5% Lilliefors Critical Value				0.177		Data Not Normal at 5% Significance Level					
671	<b>Data Not Normal at 5% Significance Level</b>											
672												
673	<b>Assuming Normal Distribution</b>											
674	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
675	95% Student's-t UCL				428.1		95% Adjusted-CLT UCL (Chen-1995)				440.3	
676							95% Modified-t UCL (Johnson-1978)				430.7	
677												
678	<b>Gamma GOF Test</b>											
679	A-D Test Statistic				0.552		<b>Anderson-Darling Gamma GOF Test</b>					
680	5% A-D Critical Value				0.759		Detected data appear Gamma Distributed at 5% Significance Level					
681	K-S Test Statistic				0.146		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
682	5% K-S Critical Value				0.181		Detected data appear Gamma Distributed at 5% Significance Level					
683	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
684												
685	<b>Gamma Statistics</b>											
686	k hat (MLE)				1.713		k star (bias corrected MLE)				1.527	
687	Theta hat (MLE)				193.2		Theta star (bias corrected MLE)				216.8	
688	nu hat (MLE)				82.22		nu star (bias corrected)				73.28	
689	MLE Mean (bias corrected)				330.9		MLE Sd (bias corrected)				267.8	

	A	B	C	D	E	F	G	H	I	J	K	L
690							Approximate Chi Square Value (0.05)					54.56
691	Adjusted Level of Significance					0.0392	Adjusted Chi Square Value					53.43
692												
693	<b>Assuming Gamma Distribution</b>											
694	95% Approximate Gamma UCL (use when n>=50)					444.4	95% Adjusted Gamma UCL (use when n<50)					453.8
695												
696	<b>Lognormal GOF Test</b>											
697	Shapiro Wilk Test Statistic					0.955	<b>Shapiro Wilk Lognormal GOF Test</b>					
698	5% Shapiro Wilk Critical Value					0.916	Data appear Lognormal at 5% Significance Level					
699	Lilliefors Test Statistic					0.144	<b>Lilliefors Lognormal GOF Test</b>					
700	5% Lilliefors Critical Value					0.177	Data appear Lognormal at 5% Significance Level					
701	<b>Data appear Lognormal at 5% Significance Level</b>											
702												
703	<b>Lognormal Statistics</b>											
704	Minimum of Logged Data					4.165	Mean of logged Data					5.482
705	Maximum of Logged Data					6.928	SD of logged Data					0.82
706												
707	<b>Assuming Lognormal Distribution</b>											
708	95% H-UCL					499.5	90% Chebyshev (MVUE) UCL					512.2
709	95% Chebyshev (MVUE) UCL					594.6	97.5% Chebyshev (MVUE) UCL					709
710	99% Chebyshev (MVUE) UCL					933.6						
711												
712	<b>Nonparametric Distribution Free UCL Statistics</b>											
713	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
714												
715	<b>Nonparametric Distribution Free UCLs</b>											
716	95% CLT UCL					424.2	95% Jackknife UCL					428.1
717	95% Standard Bootstrap UCL					421.7	95% Bootstrap-t UCL					461.1
718	95% Hall's Bootstrap UCL					438.7	95% Percentile Bootstrap UCL					428.6
719	95% BCA Bootstrap UCL					439.5						
720	90% Chebyshev(Mean, Sd) UCL					501.1	95% Chebyshev(Mean, Sd) UCL					578.2
721	97.5% Chebyshev(Mean, Sd) UCL					685.3	99% Chebyshev(Mean, Sd) UCL					895.5
722												
723	<b>Suggested UCL to Use</b>											
724	95% Adjusted Gamma UCL					453.8						
725												
726	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
727	Recommendations are based upon data size, data distribution, and skewness.											
728	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
729	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
730												
731												
732	<b>Manganese</b>											
733												
734	<b>General Statistics</b>											
735	Total Number of Observations					24	Number of Distinct Observations					24
736							Number of Missing Observations					0
737	Minimum					105	Mean					1184
738	Maximum					3350	Median					939.5
739	SD					914.6	Std. Error of Mean					186.7
740	Coefficient of Variation					0.772	Skewness					1.127
741												
742	<b>Normal GOF Test</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
743	Shapiro Wilk Test Statistic					0.882	Shapiro Wilk GOF Test					
744	5% Shapiro Wilk Critical Value					0.916	Data Not Normal at 5% Significance Level					
745	Lilliefors Test Statistic					0.212	Lilliefors GOF Test					
746	5% Lilliefors Critical Value					0.177	Data Not Normal at 5% Significance Level					
747	Data Not Normal at 5% Significance Level											
748												
749	Assuming Normal Distribution											
750	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
751	95% Student's-t UCL					1504	95% Adjusted-CLT UCL (Chen-1995)					1537
752							95% Modified-t UCL (Johnson-1978)					1511
753												
754	Gamma GOF Test											
755	A-D Test Statistic					0.186	Anderson-Darling Gamma GOF Test					
756	5% A-D Critical Value					0.759	Detected data appear Gamma Distributed at 5% Significance Level					
757	K-S Test Statistic					0.109	Kolmogorov-Smirnov Gamma GOF Test					
758	5% K-S Critical Value					0.181	Detected data appear Gamma Distributed at 5% Significance Level					
759	Detected data appear Gamma Distributed at 5% Significance Level											
760												
761	Gamma Statistics											
762	k hat (MLE)					1.675	k star (bias corrected MLE)					1.493
763	Theta hat (MLE)					707.1	Theta star (bias corrected MLE)					793.1
764	nu hat (MLE)					80.38	nu star (bias corrected)					71.66
765	MLE Mean (bias corrected)					1184	MLE Sd (bias corrected)					969
766							Approximate Chi Square Value (0.05)					53.17
767	Adjusted Level of Significance					0.0392	Adjusted Chi Square Value					52.05
768												
769	Assuming Gamma Distribution											
770	95% Approximate Gamma UCL (use when n>=50)					1596	95% Adjusted Gamma UCL (use when n<50)					1630
771												
772	Lognormal GOF Test											
773	Shapiro Wilk Test Statistic					0.957	Shapiro Wilk Lognormal GOF Test					
774	5% Shapiro Wilk Critical Value					0.916	Data appear Lognormal at 5% Significance Level					
775	Lilliefors Test Statistic					0.117	Lilliefors Lognormal GOF Test					
776	5% Lilliefors Critical Value					0.177	Data appear Lognormal at 5% Significance Level					
777	Data appear Lognormal at 5% Significance Level											
778												
779	Lognormal Statistics											
780	Minimum of Logged Data					4.654	Mean of logged Data					6.749
781	Maximum of Logged Data					8.117	SD of logged Data					0.904
782												
783	Assuming Lognormal Distribution											
784	95% H-UCL					2027	90% Chebyshev (MVUE) UCL					2030
785	95% Chebyshev (MVUE) UCL					2381	97.5% Chebyshev (MVUE) UCL					2868
786	99% Chebyshev (MVUE) UCL					3825						
787												
788	Nonparametric Distribution Free UCL Statistics											
789	Data appear to follow a Discernible Distribution at 5% Significance Level											
790												
791	Nonparametric Distribution Free UCLs											
792	95% CLT UCL					1491	95% Jackknife UCL					1504
793	95% Standard Bootstrap UCL					1481	95% Bootstrap-t UCL					1571
794	95% Hall's Bootstrap UCL					1537	95% Percentile Bootstrap UCL					1500
795	95% BCA Bootstrap UCL					1553						



	A	B	C	D	E	F	G	H	I	J	K	L
796	90% Chebyshev(Mean, Sd) UCL					1744	95% Chebyshev(Mean, Sd) UCL					1998
797	97.5% Chebyshev(Mean, Sd) UCL					2350	99% Chebyshev(Mean, Sd) UCL					3042
798												
799	<b>Suggested UCL to Use</b>											
800	95% Adjusted Gamma UCL					1630						
801												
802	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
803	Recommendations are based upon data size, data distribution, and skewness.											
804	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
805	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
806												
807												
808	<b>Mercury</b>											
809												
810	<b>General Statistics</b>											
811	Total Number of Observations					24	Number of Distinct Observations					24
812							Number of Missing Observations					0
813	Minimum					0.046	Mean					0.297
814	Maximum					1.01	Median					0.183
815	SD					0.271	Std. Error of Mean					0.0552
816	Coefficient of Variation					0.911	Skewness					1.519
817												
818	<b>Normal GOF Test</b>											
819	Shapiro Wilk Test Statistic					0.766	<b>Shapiro Wilk GOF Test</b>					
820	5% Shapiro Wilk Critical Value					0.916	Data Not Normal at 5% Significance Level					
821	Lilliefors Test Statistic					0.27	<b>Lilliefors GOF Test</b>					
822	5% Lilliefors Critical Value					0.177	Data Not Normal at 5% Significance Level					
823	<b>Data Not Normal at 5% Significance Level</b>											
824												
825	<b>Assuming Normal Distribution</b>											
826	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
827	95% Student's-t UCL					0.391	95% Adjusted-CLT UCL (Chen-1995)					0.406
828							95% Modified-t UCL (Johnson-1978)					0.394
829												
830	<b>Gamma GOF Test</b>											
831	A-D Test Statistic					1.033	<b>Anderson-Darling Gamma GOF Test</b>					
832	5% A-D Critical Value					0.76	Data Not Gamma Distributed at 5% Significance Level					
833	K-S Test Statistic					0.182	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
834	5% K-S Critical Value					0.181	Data Not Gamma Distributed at 5% Significance Level					
835	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
836												
837	<b>Gamma Statistics</b>											
838	k hat (MLE)					1.652	k star (bias corrected MLE)					1.474
839	Theta hat (MLE)					0.18	Theta star (bias corrected MLE)					0.201
840	nu hat (MLE)					79.31	nu star (bias corrected)					70.73
841	MLE Mean (bias corrected)					0.297	MLE Sd (bias corrected)					0.245
842							Approximate Chi Square Value (0.05)					52.37
843	Adjusted Level of Significance					0.0392	Adjusted Chi Square Value					51.26
844												
845	<b>Assuming Gamma Distribution</b>											
846	95% Approximate Gamma UCL (use when n>=50))					0.401	95% Adjusted Gamma UCL (use when n<50)					0.41
847												
848	<b>Lognormal GOF Test</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
849	Shapiro Wilk Test Statistic					0.952	Shapiro Wilk Lognormal GOF Test					
850	5% Shapiro Wilk Critical Value					0.916	Data appear Lognormal at 5% Significance Level					
851	Lilliefors Test Statistic					0.127	Lilliefors Lognormal GOF Test					
852	5% Lilliefors Critical Value					0.177	Data appear Lognormal at 5% Significance Level					
853	Data appear Lognormal at 5% Significance Level											
854												
855	Lognormal Statistics											
856	Minimum of Logged Data					-3.079	Mean of logged Data					-1.547
857	Maximum of Logged Data					0.00995	SD of logged Data					0.81
858												
859	Assuming Lognormal Distribution											
860	95% H-UCL					0.436	90% Chebyshev (MVUE) UCL					0.448
861	95% Chebyshev (MVUE) UCL					0.52	97.5% Chebyshev (MVUE) UCL					0.619
862	99% Chebyshev (MVUE) UCL					0.814						
863												
864	Nonparametric Distribution Free UCL Statistics											
865	Data appear to follow a Discernible Distribution at 5% Significance Level											
866												
867	Nonparametric Distribution Free UCLs											
868	95% CLT UCL					0.388	95% Jackknife UCL					0.391
869	95% Standard Bootstrap UCL					0.39	95% Bootstrap-t UCL					0.418
870	95% Hall's Bootstrap UCL					0.391	95% Percentile Bootstrap UCL					0.393
871	95% BCA Bootstrap UCL					0.409						
872	90% Chebyshev(Mean, Sd) UCL					0.463	95% Chebyshev(Mean, Sd) UCL					0.538
873	97.5% Chebyshev(Mean, Sd) UCL					0.642	99% Chebyshev(Mean, Sd) UCL					0.846
874												
875	Suggested UCL to Use											
876	95% H-UCL					0.436						
877												
878	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
879	Recommendations are based upon data size, data distribution, and skewness.											
880	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
881	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
882												
883	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
884	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
885	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
886	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
887												
888												
889	Silver											
890												
891	General Statistics											
892	Total Number of Observations					22	Number of Distinct Observations					17
893							Number of Missing Observations					0
894	Minimum					0.1	Mean					3.014
895	Maximum					21	Median					0.65
896	SD					5.611	Std. Error of Mean					1.196
897	Coefficient of Variation					1.862	Skewness					2.534
898												
899	Normal GOF Test											
900	Shapiro Wilk Test Statistic					0.546	Shapiro Wilk GOF Test					
901	5% Shapiro Wilk Critical Value					0.911	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
902	Lilliefors Test Statistic					0.372	Lilliefors GOF Test					
903	5% Lilliefors Critical Value					0.184	Data Not Normal at 5% Significance Level					
904	Data Not Normal at 5% Significance Level											
905												
906	Assuming Normal Distribution											
907	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
908	95% Student's-t UCL					5.072	95% Adjusted-CLT UCL (Chen-1995)					5.672
909						95% Modified-t UCL (Johnson-1978)					5.18	
910												
911	Gamma GOF Test											
912	A-D Test Statistic					1.548	Anderson-Darling Gamma GOF Test					
913	5% A-D Critical Value					0.8	Data Not Gamma Distributed at 5% Significance Level					
914	K-S Test Statistic					0.21	Kolmogorov-Smirnov Gamma GOF Test					
915	5% K-S Critical Value					0.195	Data Not Gamma Distributed at 5% Significance Level					
916	Data Not Gamma Distributed at 5% Significance Level											
917												
918	Gamma Statistics											
919	k hat (MLE)					0.551	k star (bias corrected MLE)					0.506
920	Theta hat (MLE)					5.472	Theta star (bias corrected MLE)					5.957
921	nu hat (MLE)					24.23	nu star (bias corrected)					22.26
922	MLE Mean (bias corrected)					3.014	MLE Sd (bias corrected)					4.237
923						Approximate Chi Square Value (0.05)					12.53	
924	Adjusted Level of Significance					0.0386	Adjusted Chi Square Value					11.99
925												
926	Assuming Gamma Distribution											
927	95% Approximate Gamma UCL (use when n>=50))					5.352	95% Adjusted Gamma UCL (use when n<50)					5.595
928												
929	Lognormal GOF Test											
930	Shapiro Wilk Test Statistic					0.946	Shapiro Wilk Lognormal GOF Test					
931	5% Shapiro Wilk Critical Value					0.911	Data appear Lognormal at 5% Significance Level					
932	Lilliefors Test Statistic					0.133	Lilliefors Lognormal GOF Test					
933	5% Lilliefors Critical Value					0.184	Data appear Lognormal at 5% Significance Level					
934	Data appear Lognormal at 5% Significance Level											
935												
936	Lognormal Statistics											
937	Minimum of Logged Data					-2.303	Mean of logged Data					-0.0332
938	Maximum of Logged Data					3.045	SD of logged Data					1.464
939												
940	Assuming Lognormal Distribution											
941	95% H-UCL					8.063	90% Chebyshev (MVUE) UCL					5.5
942	95% Chebyshev (MVUE) UCL					6.821	97.5% Chebyshev (MVUE) UCL					8.656
943	99% Chebyshev (MVUE) UCL					12.26						
944												
945	Nonparametric Distribution Free UCL Statistics											
946	Data appear to follow a Discernible Distribution at 5% Significance Level											
947												
948	Nonparametric Distribution Free UCLs											
949	95% CLT UCL					4.981	95% Jackknife UCL					5.072
950	95% Standard Bootstrap UCL					4.933	95% Bootstrap-t UCL					7.795
951	95% Hall's Bootstrap UCL					5.393	95% Percentile Bootstrap UCL					5.041
952	95% BCA Bootstrap UCL					5.705						
953	90% Chebyshev(Mean, Sd) UCL					6.602	95% Chebyshev(Mean, Sd) UCL					8.228
954	97.5% Chebyshev(Mean, Sd) UCL					10.48	99% Chebyshev(Mean, Sd) UCL					14.92

	A	B	C	D	E	F	G	H	I	J	K	L		
955														
956	<b>Suggested UCL to Use</b>													
957	95% Chebyshev (Mean, Sd) UCL					8.228								
958														
959	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.													
960	Recommendations are based upon data size, data distribution, and skewness.													
961	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).													
962	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.													
963														
964	<b>Thallium</b>													
965														
966	<b>General Statistics</b>													
967	Total Number of Observations				8		Number of Distinct Observations				7			
968	Number of Detects				7		Number of Non-Detects				1			
969	Number of Distinct Detects				6		Number of Distinct Non-Detects				1			
970	Minimum Detect				0.7		Minimum Non-Detect				11			
971	Maximum Detect				4.1		Maximum Non-Detect				11			
972	Variance Detects				1.543		Percent Non-Detects				12.5%			
973	Mean Detects				1.757		SD Detects				1.242			
974	Median Detects				1.3		CV Detects				0.707			
975	Skewness Detects				1.24		Kurtosis Detects				1.13			
976	Mean of Logged Detects				0.362		SD of Logged Detects				0.678			
977														
978	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>													
979	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>													
980	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>													
981	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>													
982														
983	<b>Normal GOF Test on Detects Only</b>													
984	Shapiro Wilk Test Statistic				0.847		<b>Shapiro Wilk GOF Test</b>							
985	5% Shapiro Wilk Critical Value				0.803		Detected Data appear Normal at 5% Significance Level							
986	Lilliefors Test Statistic				0.215		<b>Lilliefors GOF Test</b>							
987	5% Lilliefors Critical Value				0.304		Detected Data appear Normal at 5% Significance Level							
988	<b>Detected Data appear Normal at 5% Significance Level</b>													
989														
990	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>													
991	KM Mean				1.757		KM Standard Error of Mean				0.469			
992	KM SD				1.15		95% KM (BCA) UCL						2.625	
993	95% KM (t) UCL				2.647		95% KM (Percentile Bootstrap) UCL						2.5	
994	95% KM (z) UCL				2.529		95% KM Bootstrap t UCL						3.254	
995	90% KM Chebyshev UCL				3.166		95% KM Chebyshev UCL						3.804	
996	97.5% KM Chebyshev UCL				4.689		99% KM Chebyshev UCL						6.428	
997														
998	<b>Gamma GOF Tests on Detected Observations Only</b>													
999	A-D Test Statistic				0.427		<b>Anderson-Darling GOF Test</b>							
1000	5% A-D Critical Value				0.713		Detected data appear Gamma Distributed at 5% Significance Level							
1001	K-S Test Statistic				0.248		<b>Kolmogorov-Smirnov GOF</b>							
1002	5% K-S Critical Value				0.314		Detected data appear Gamma Distributed at 5% Significance Level							
1003	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>													
1004														
1005	<b>Gamma Statistics on Detected Data Only</b>													
1006	k hat (MLE)				2.634		k star (bias corrected MLE)				1.601			
1007	Theta hat (MLE)				0.667		Theta star (bias corrected MLE)				1.098			

	A	B	C	D	E	F	G	H	I	J	K	L
1008					nu hat (MLE)	36.88				nu star (bias corrected)		22.41
1009					Mean (detects)	1.757						
1010												
1011	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1012	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1013	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1014	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1015	This is especially true when the sample size is small.											
1016	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1017					Minimum	0.7				Mean		1.735
1018					Maximum	4.1				Median		1.442
1019					SD	1.152				CV		0.664
1020					k hat (MLE)	2.981				k star (bias corrected MLE)		1.946
1021					Theta hat (MLE)	0.582				Theta star (bias corrected MLE)		0.892
1022					nu hat (MLE)	47.69				nu star (bias corrected)		31.14
1023					Adjusted Level of Significance ( $\beta$ )	0.0195						
1024					Approximate Chi Square Value (31.14, $\alpha$ )	19.39				Adjusted Chi Square Value (31.14, $\beta$ )		17.09
1025					95% Gamma Approximate UCL (use when $n \geq 50$ )	2.787				95% Gamma Adjusted UCL (use when $n < 50$ )		3.163
1026												
1027	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1028					Mean (KM)	1.757				SD (KM)		1.15
1029					Variance (KM)	1.322				SE of Mean (KM)		0.469
1030					k hat (KM)	2.335				k star (KM)		1.543
1031					nu hat (KM)	37.36				nu star (KM)		24.68
1032					theta hat (KM)	0.753				theta star (KM)		1.139
1033					80% gamma percentile (KM)	2.71				90% gamma percentile (KM)		3.637
1034					95% gamma percentile (KM)	4.535				99% gamma percentile (KM)		6.559
1035												
1036	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1037					Approximate Chi Square Value (24.68, $\alpha$ )	14.37				Adjusted Chi Square Value (24.68, $\beta$ )		12.42
1038					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	3.018				95% Gamma Adjusted KM-UCL (use when $n < 50$ )		3.491
1039												
1040	<b>Lognormal GOF Test on Detected Observations Only</b>											
1041					Shapiro Wilk Test Statistic	0.901				<b>Shapiro Wilk GOF Test</b>		
1042					5% Shapiro Wilk Critical Value	0.803				Detected Data appear Lognormal at 5% Significance Level		
1043					Lilliefors Test Statistic	0.235				<b>Lilliefors GOF Test</b>		
1044					5% Lilliefors Critical Value	0.304				Detected Data appear Lognormal at 5% Significance Level		
1045	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1046												
1047	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1048					Mean in Original Scale	1.717				Mean in Log Scale		0.362
1049					SD in Original Scale	1.156				SD in Log Scale		0.628
1050					95% t UCL (assumes normality of ROS data)	2.491				95% Percentile Bootstrap UCL		2.342
1051					95% BCA Bootstrap UCL	2.58				95% Bootstrap t UCL		2.915
1052					95% H-UCL (Log ROS)	3.231						
1053												
1054	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1055					KM Mean (logged)	0.362				KM Geo Mean		1.436
1056					KM SD (logged)	0.628				95% Critical H Value (KM-Log)		2.587
1057					KM Standard Error of Mean (logged)	0.256				95% H-UCL (KM -Log)		3.231
1058					KM SD (logged)	0.628				95% Critical H Value (KM-Log)		2.587
1059					KM Standard Error of Mean (logged)	0.256						
1060												

	A	B	C	D	E	F	G	H	I	J	K	L
1061	<b>DL/2 Statistics</b>											
1062	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1063	Mean in Original Scale					2.225	Mean in Log Scale					0.53
1064	SD in Original Scale					1.753	SD in Log Scale					0.787
1065	95% t UCL (Assumes normality)					3.399	95% H-Stat UCL					5.522
1066	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1067												
1068	<b>Nonparametric Distribution Free UCL Statistics</b>											
1069	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>											
1070												
1071	<b>Suggested UCL to Use</b>											
1072	95% KM (t) UCL					2.647						
1073												
1074	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1075	Recommendations are based upon data size, data distribution, and skewness.											
1076	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1077	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1078												
1079												
1080	<b>Vanadium</b>											
1081												
1082	<b>General Statistics</b>											
1083	Total Number of Observations				24	Number of Distinct Observations				23		
1084						Number of Missing Observations				0		
1085	Minimum				7.3	Mean				18.27		
1086	Maximum				28.8	Median				17.8		
1087	SD				5.593	Std. Error of Mean				1.142		
1088	Coefficient of Variation				0.306	Skewness				0.231		
1089												
1090	<b>Normal GOF Test</b>											
1091	Shapiro Wilk Test Statistic				0.975	<b>Shapiro Wilk GOF Test</b>						
1092	5% Shapiro Wilk Critical Value				0.916	Data appear Normal at 5% Significance Level						
1093	Lilliefors Test Statistic				0.129	<b>Lilliefors GOF Test</b>						
1094	5% Lilliefors Critical Value				0.177	Data appear Normal at 5% Significance Level						
1095	<b>Data appear Normal at 5% Significance Level</b>											
1096												
1097	<b>Assuming Normal Distribution</b>											
1098	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
1099	95% Student's-t UCL				20.22	95% Adjusted-CLT UCL (Chen-1995)				20.2		
1100						95% Modified-t UCL (Johnson-1978)				20.23		
1101												
1102	<b>Gamma GOF Test</b>											
1103	A-D Test Statistic				0.176	<b>Anderson-Darling Gamma GOF Test</b>						
1104	5% A-D Critical Value				0.744	Detected data appear Gamma Distributed at 5% Significance Level						
1105	K-S Test Statistic				0.0887	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
1106	5% K-S Critical Value				0.178	Detected data appear Gamma Distributed at 5% Significance Level						
1107	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1108												
1109	<b>Gamma Statistics</b>											
1110	k hat (MLE)				10.41	k star (bias corrected MLE)				9.138		
1111	Theta hat (MLE)				1.754	Theta star (bias corrected MLE)				1.999		
1112	nu hat (MLE)				499.8	nu star (bias corrected)				438.6		
1113	MLE Mean (bias corrected)				18.27	MLE Sd (bias corrected)				6.043		

	A	B	C	D	E	F	G	H	I	J	K	L
1114							Approximate Chi Square Value (0.05)					391.1
1115	Adjusted Level of Significance				0.0392	Adjusted Chi Square Value						387.9
1116												
1117	<b>Assuming Gamma Distribution</b>											
1118	95% Approximate Gamma UCL (use when n>=50))				20.49	95% Adjusted Gamma UCL (use when n<50)					20.65	
1119												
1120	<b>Lognormal GOF Test</b>											
1121	Shapiro Wilk Test Statistic				0.964	<b>Shapiro Wilk Lognormal GOF Test</b>						
1122	5% Shapiro Wilk Critical Value				0.916	Data appear Lognormal at 5% Significance Level						
1123	Lilliefors Test Statistic				0.0934	<b>Lilliefors Lognormal GOF Test</b>						
1124	5% Lilliefors Critical Value				0.177	Data appear Lognormal at 5% Significance Level						
1125	<b>Data appear Lognormal at 5% Significance Level</b>											
1126												
1127	<b>Lognormal Statistics</b>											
1128	Minimum of Logged Data				1.988	Mean of logged Data					2.856	
1129	Maximum of Logged Data				3.36	SD of logged Data					0.329	
1130												
1131	<b>Assuming Lognormal Distribution</b>											
1132	95% H-UCL				20.85	90% Chebyshev (MVUE) UCL					22.09	
1133	95% Chebyshev (MVUE) UCL				23.79	97.5% Chebyshev (MVUE) UCL					26.16	
1134	99% Chebyshev (MVUE) UCL				30.81							
1135												
1136	<b>Nonparametric Distribution Free UCL Statistics</b>											
1137	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
1138												
1139	<b>Nonparametric Distribution Free UCLs</b>											
1140	95% CLT UCL				20.14	95% Jackknife UCL					20.22	
1141	95% Standard Bootstrap UCL				20.12	95% Bootstrap-t UCL					20.36	
1142	95% Hall's Bootstrap UCL				20.24	95% Percentile Bootstrap UCL					20.15	
1143	95% BCA Bootstrap UCL				20.05							
1144	90% Chebyshev(Mean, Sd) UCL				21.69	95% Chebyshev(Mean, Sd) UCL					23.24	
1145	97.5% Chebyshev(Mean, Sd) UCL				25.4	99% Chebyshev(Mean, Sd) UCL					29.63	
1146												
1147	<b>Suggested UCL to Use</b>											
1148	95% Student's-t UCL				20.22							
1149												
1150	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1151	Recommendations are based upon data size, data distribution, and skewness.											
1152	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1153	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1154												
1155												
1156	<b>Zinc</b>											
1157												
1158	<b>General Statistics</b>											
1159	Total Number of Observations				24	Number of Distinct Observations					23	
1160						Number of Missing Observations					0	
1161	Minimum				140	Mean					691	
1162	Maximum				4730	Median					361.5	
1163	SD				1067	Std. Error of Mean					217.7	
1164	Coefficient of Variation				1.544	Skewness					3.215	
1165												
1166	<b>Normal GOF Test</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1167	Shapiro Wilk Test Statistic					0.502	Shapiro Wilk GOF Test					
1168	5% Shapiro Wilk Critical Value					0.916	Data Not Normal at 5% Significance Level					
1169	Lilliefors Test Statistic					0.348	Lilliefors GOF Test					
1170	5% Lilliefors Critical Value					0.177	Data Not Normal at 5% Significance Level					
1171	Data Not Normal at 5% Significance Level											
1172												
1173	Assuming Normal Distribution											
1174	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
1175	95% Student's-t UCL					1064	95% Adjusted-CLT UCL (Chen-1995)					1202
1176							95% Modified-t UCL (Johnson-1978)					1088
1177												
1178	Gamma GOF Test											
1179	A-D Test Statistic					1.986	Anderson-Darling Gamma GOF Test					
1180	5% A-D Critical Value					0.77	Data Not Gamma Distributed at 5% Significance Level					
1181	K-S Test Statistic					0.209	Kolmogorov-Smirnov Gamma GOF Test					
1182	5% K-S Critical Value					0.183	Data Not Gamma Distributed at 5% Significance Level					
1183	Data Not Gamma Distributed at 5% Significance Level											
1184												
1185	Gamma Statistics											
1186	k hat (MLE)					1.088	k star (bias corrected MLE)					0.979
1187	Theta hat (MLE)					635.3	Theta star (bias corrected MLE)					705.5
1188	nu hat (MLE)					52.21	nu star (bias corrected)					47.02
1189	MLE Mean (bias corrected)					691	MLE Sd (bias corrected)					698.2
1190							Approximate Chi Square Value (0.05)					32.28
1191	Adjusted Level of Significance					0.0392	Adjusted Chi Square Value					31.42
1192												
1193	Assuming Gamma Distribution											
1194	95% Approximate Gamma UCL (use when n>=50))					1006	95% Adjusted Gamma UCL (use when n<50)					1034
1195												
1196	Lognormal GOF Test											
1197	Shapiro Wilk Test Statistic					0.883	Shapiro Wilk Lognormal GOF Test					
1198	5% Shapiro Wilk Critical Value					0.916	Data Not Lognormal at 5% Significance Level					
1199	Lilliefors Test Statistic					0.116	Lilliefors Lognormal GOF Test					
1200	5% Lilliefors Critical Value					0.177	Data appear Lognormal at 5% Significance Level					
1201	Data appear Approximate Lognormal at 5% Significance Level											
1202												
1203	Lognormal Statistics											
1204	Minimum of Logged Data					4.942	Mean of logged Data					6.013
1205	Maximum of Logged Data					8.462	SD of logged Data					0.892
1206												
1207	Assuming Lognormal Distribution											
1208	95% H-UCL					951.3	90% Chebyshev (MVUE) UCL					956.3
1209	95% Chebyshev (MVUE) UCL					1120	97.5% Chebyshev (MVUE) UCL					1347
1210	99% Chebyshev (MVUE) UCL					1793						
1211												
1212	Nonparametric Distribution Free UCL Statistics											
1213	Data appear to follow a Discernible Distribution at 5% Significance Level											
1214												
1215	Nonparametric Distribution Free UCLs											
1216	95% CLT UCL					1049	95% Jackknife UCL					1064
1217	95% Standard Bootstrap UCL					1035	95% Bootstrap-t UCL					2327
1218	95% Hall's Bootstrap UCL					2962	95% Percentile Bootstrap UCL					1083
1219	95% BCA Bootstrap UCL					1244						



	A	B	C	D	E	F	G	H	I	J	K	L
1220	90% Chebyshev(Mean, Sd) UCL					1344	95% Chebyshev(Mean, Sd) UCL					1640
1221	97.5% Chebyshev(Mean, Sd) UCL					2051	99% Chebyshev(Mean, Sd) UCL					2857
1222												
1223	<b>Suggested UCL to Use</b>											
1224	95% H-UCL					951.3						
1225												
1226	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1227	Recommendations are based upon data size, data distribution, and skewness.											
1228	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1229	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1230												
1231	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
1232	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
1233	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
1234	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
1235												
1236	<b>Aroclor 1254</b>											
1237												
1238	<b>General Statistics</b>											
1239	Total Number of Observations					4	Number of Distinct Observations					4
1240	Number of Detects					2	Number of Non-Detects					2
1241	Number of Distinct Detects					2	Number of Distinct Non-Detects					2
1242	Minimum Detect					0.11	Minimum Non-Detect					0.045
1243	Maximum Detect					0.44	Maximum Non-Detect					0.051
1244	Variance Detects					0.0545	Percent Non-Detects					50%
1245	Mean Detects					0.275	SD Detects					0.233
1246	Median Detects					0.275	CV Detects					0.849
1247	Skewness Detects					N/A	Kurtosis Detects					N/A
1248	Mean of Logged Detects					-1.514	SD of Logged Detects					0.98
1249												
1250	<b>Warning: Data set has only 2 Detected Values.</b>											
1251	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											
1252												
1253												
1254	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1255	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1256	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1257	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1258												
1259	<b>Normal GOF Test on Detects Only</b>											
1260	<b>Not Enough Data to Perform GOF Test</b>											
1261												
1262	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1263	KM Mean					0.16	KM Standard Error of Mean					0.116
1264	KM SD					0.164	95% KM (BCA) UCL					N/A
1265	95% KM (t) UCL					0.433	95% KM (Percentile Bootstrap) UCL					N/A
1266	95% KM (z) UCL					0.351	95% KM Bootstrap t UCL					N/A
1267	90% KM Chebyshev UCL					0.508	95% KM Chebyshev UCL					0.665
1268	97.5% KM Chebyshev UCL					0.883	99% KM Chebyshev UCL					1.313
1269												
1270	<b>Gamma GOF Tests on Detected Observations Only</b>											
1271	<b>Not Enough Data to Perform GOF Test</b>											
1272												

	A	B	C	D	E	F	G	H	I	J	K	L	
1273	<b>Gamma Statistics on Detected Data Only</b>												
1274	k hat (MLE)				2.394	k star (bias corrected MLE)				N/A			
1275	Theta hat (MLE)				0.115	Theta star (bias corrected MLE)				N/A			
1276	nu hat (MLE)				9.577	nu star (bias corrected)				N/A			
1277	Mean (detects)				0.275								
1278													
1279	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1280	Mean (KM)				0.16	SD (KM)				0.164			
1281	Variance (KM)				0.0268	SE of Mean (KM)				0.116			
1282	k hat (KM)				0.954	k star (KM)				0.405			
1283	nu hat (KM)				7.631	nu star (KM)				3.241			
1284	theta hat (KM)				0.168	theta star (KM)				0.395			
1285	80% gamma percentile (KM)				0.259	90% gamma percentile (KM)				0.451			
1286	95% gamma percentile (KM)				0.662	99% gamma percentile (KM)				1.192			
1287													
1288	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1289					Adjusted Level of Significance ( $\beta$ )				0.00498				
1290	Approximate Chi Square Value (3.24, $\alpha$ )				0.447	Adjusted Chi Square Value (3.24, $\beta$ )				0.126			
1291	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				1.159	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				4.115			
1292													
1293	<b>Lognormal GOF Test on Detected Observations Only</b>												
1294	<b>Not Enough Data to Perform GOF Test</b>												
1295													
1296	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1297	Mean in Original Scale				0.141	Mean in Log Scale				-3.288			
1298	SD in Original Scale				0.205	SD in Log Scale				2.125			
1299	95% t UCL (assumes normality of ROS data)				0.382	95% Percentile Bootstrap UCL				N/A			
1300	95% BCA Bootstrap UCL				N/A	95% Bootstrap t UCL				N/A			
1301	95% H-UCL (Log ROS)				9346768								
1302													
1303	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1304	KM Mean (logged)				-2.308	KM Geo Mean				0.0995			
1305	KM SD (logged)				0.933	95% Critical H Value (KM-Log)				6.243			
1306	KM Standard Error of Mean (logged)				0.659	95% H-UCL (KM -Log)				4.433			
1307	KM SD (logged)				0.933	95% Critical H Value (KM-Log)				6.243			
1308	KM Standard Error of Mean (logged)				0.659								
1309													
1310	<b>DL/2 Statistics</b>												
1311	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>						
1312	Mean in Original Scale				0.15	Mean in Log Scale				-2.623			
1313	SD in Original Scale				0.198	SD in Log Scale				1.401			
1314	95% t UCL (Assumes normality)				0.382	95% H-Stat UCL				338.8			
1315	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
1316													
1317	<b>Nonparametric Distribution Free UCL Statistics</b>												
1318	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>												
1319													
1320	<b>Suggested UCL to Use</b>												
1321	95% KM (Chebyshev) UCL				0.665								
1322	<b>Warning: Recommended UCL exceeds the maximum observation</b>												
1323													
1324	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1325	Recommendations are based upon data size, data distribution, and skewness.												

	A	B	C	D	E	F	G	H	I	J	K	L
1326	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1327	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1328												
1329	<b>Aroclor 1260</b>											
1330												
1331	<b>General Statistics</b>											
1332	Total Number of Observations				16		Number of Distinct Observations				16	
1333	Number of Detects				13		Number of Non-Detects				3	
1334	Number of Distinct Detects				13		Number of Distinct Non-Detects				3	
1335	Minimum Detect				0.023		Minimum Non-Detect				0.037	
1336	Maximum Detect				0.42		Maximum Non-Detect				0.051	
1337	Variance Detects				0.012		Percent Non-Detects				18.75%	
1338	Mean Detects				0.0978		SD Detects				0.109	
1339	Median Detects				0.064		CV Detects				1.119	
1340	Skewness Detects				2.426		Kurtosis Detects				6.642	
1341	Mean of Logged Detects				-2.743		SD of Logged Detects				0.907	
1342												
1343	<b>Normal GOF Test on Detects Only</b>											
1344	Shapiro Wilk Test Statistic				0.7		<b>Shapiro Wilk GOF Test</b>					
1345	5% Shapiro Wilk Critical Value				0.866		Detected Data Not Normal at 5% Significance Level					
1346	Lilliefors Test Statistic				0.247		<b>Lilliefors GOF Test</b>					
1347	5% Lilliefors Critical Value				0.234		Detected Data Not Normal at 5% Significance Level					
1348	<b>Detected Data Not Normal at 5% Significance Level</b>											
1349												
1350	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1351	KM Mean				0.0848		KM Standard Error of Mean				0.0257	
1352	KM SD				0.0986		95% KM (BCA) UCL				0.132	
1353	95% KM (t) UCL				0.13		95% KM (Percentile Bootstrap) UCL				0.13	
1354	95% KM (z) UCL				0.127		95% KM Bootstrap t UCL				0.177	
1355	90% KM Chebyshev UCL				0.162		95% KM Chebyshev UCL				0.197	
1356	97.5% KM Chebyshev UCL				0.245		99% KM Chebyshev UCL				0.34	
1357												
1358	<b>Gamma GOF Tests on Detected Observations Only</b>											
1359	A-D Test Statistic				0.547		<b>Anderson-Darling GOF Test</b>					
1360	5% A-D Critical Value				0.753		Detected data appear Gamma Distributed at 5% Significance Level					
1361	K-S Test Statistic				0.171		<b>Kolmogorov-Smirnov GOF</b>					
1362	5% K-S Critical Value				0.242		Detected data appear Gamma Distributed at 5% Significance Level					
1363	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1364												
1365	<b>Gamma Statistics on Detected Data Only</b>											
1366	k hat (MLE)				1.34		k star (bias corrected MLE)				1.082	
1367	Theta hat (MLE)				0.073		Theta star (bias corrected MLE)				0.0903	
1368	nu hat (MLE)				34.84		nu star (bias corrected)				28.14	
1369	Mean (detects)				0.0978							
1370												
1371	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1372	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1373	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1374	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1375	This is especially true when the sample size is small.											
1376	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1377	Minimum				0.01		Mean				0.0814	
1378	Maximum				0.42		Median				0.039	

	A	B	C	D	E	F	G	H	I	J	K	L	
1379					SD	0.104					CV	1.277	
1380					k hat (MLE)	1.009					k star (bias corrected MLE)	0.861	
1381					Theta hat (MLE)	0.0807					Theta star (bias corrected MLE)	0.0946	
1382					nu hat (MLE)	32.28					nu star (bias corrected)	27.56	
1383					Adjusted Level of Significance ( $\beta$ )	0.0335							
1384					Approximate Chi Square Value (27.56, $\alpha$ )	16.59					Adjusted Chi Square Value (27.56, $\beta$ )	15.62	
1385					95% Gamma Approximate UCL (use when $n \geq 50$ )	0.135					95% Gamma Adjusted UCL (use when $n < 50$ )	0.144	
1386													
1387					<b>Estimates of Gamma Parameters using KM Estimates</b>								
1388					Mean (KM)	0.0848					SD (KM)	0.0986	
1389					Variance (KM)	0.00972					SE of Mean (KM)	0.0257	
1390					k hat (KM)	0.74					k star (KM)	0.643	
1391					nu hat (KM)	23.68					nu star (KM)	20.57	
1392					theta hat (KM)	0.115					theta star (KM)	0.132	
1393					80% gamma percentile (KM)	0.14					90% gamma percentile (KM)	0.217	
1394					95% gamma percentile (KM)	0.298					99% gamma percentile (KM)	0.491	
1395													
1396					<b>Gamma Kaplan-Meier (KM) Statistics</b>								
1397					Approximate Chi Square Value (20.57, $\alpha$ )	11.28					Adjusted Chi Square Value (20.57, $\beta$ )	10.5	
1398					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.155					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	0.166	
1399													
1400					<b>Lognormal GOF Test on Detected Observations Only</b>								
1401					Shapiro Wilk Test Statistic	0.927					<b>Shapiro Wilk GOF Test</b>		
1402					5% Shapiro Wilk Critical Value	0.866					Detected Data appear Lognormal at 5% Significance Level		
1403					Lilliefors Test Statistic	0.143					<b>Lilliefors GOF Test</b>		
1404					5% Lilliefors Critical Value	0.234					Detected Data appear Lognormal at 5% Significance Level		
1405					<b>Detected Data appear Lognormal at 5% Significance Level</b>								
1406													
1407					<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>								
1408					Mean in Original Scale	0.0851					Mean in Log Scale	-2.886	
1409					SD in Original Scale	0.102					SD in Log Scale	0.868	
1410					95% t UCL (assumes normality of ROS data)	0.13					95% Percentile Bootstrap UCL	0.13	
1411					95% BCA Bootstrap UCL	0.149					95% Bootstrap t UCL	0.184	
1412					95% H-UCL (Log ROS)	0.143							
1413													
1414					<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>								
1415					KM Mean (logged)	-2.899					KM Geo Mean	0.0551	
1416					KM SD (logged)	0.854					95% Critical H Value (KM-Log)	2.488	
1417					KM Standard Error of Mean (logged)	0.224					95% H-UCL (KM -Log)	0.137	
1418					KM SD (logged)	0.854					95% Critical H Value (KM-Log)	2.488	
1419					KM Standard Error of Mean (logged)	0.224							
1420													
1421					<b>DL/2 Statistics</b>								
1422					<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>		
1423					Mean in Original Scale	0.0836					Mean in Log Scale	-2.944	
1424					SD in Original Scale	0.103					SD in Log Scale	0.922	
1425					95% t UCL (Assumes normality)	0.129					95% H-Stat UCL	0.149	
1426					<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>								
1427													
1428					<b>Nonparametric Distribution Free UCL Statistics</b>								
1429					<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>								
1430													
1431					<b>Suggested UCL to Use</b>								

	A	B	C	D	E	F	G	H	I	J	K	L
1432	95% KM Adjusted Gamma UCL					0.166	95% GROS Adjusted Gamma UCL					0.144
1433												
1434	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1435	Recommendations are based upon data size, data distribution, and skewness.											
1436	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1437	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1438												
1439	<b>4,4'-DDT (p,p'-DDT)</b>											
1440												
1441	<b>General Statistics</b>											
1442	Total Number of Observations				23	Number of Distinct Observations				15		
1443	Number of Detects				6	Number of Non-Detects				17		
1444	Number of Distinct Detects				6	Number of Distinct Non-Detects				12		
1445	Minimum Detect				0.0041	Minimum Non-Detect				0.0045		
1446	Maximum Detect				0.06	Maximum Non-Detect				0.012		
1447	Variance Detects				4.5452E-4	Percent Non-Detects				73.91%		
1448	Mean Detects				0.017	SD Detects				0.0213		
1449	Median Detects				0.0102	CV Detects				1.258		
1450	Skewness Detects				2.331	Kurtosis Detects				5.561		
1451	Mean of Logged Detects				-4.527	SD of Logged Detects				0.94		
1452												
1453	<b>Normal GOF Test on Detects Only</b>											
1454	Shapiro Wilk Test Statistic				0.635	<b>Shapiro Wilk GOF Test</b>						
1455	5% Shapiro Wilk Critical Value				0.788	Detected Data Not Normal at 5% Significance Level						
1456	Lilliefors Test Statistic				0.425	<b>Lilliefors GOF Test</b>						
1457	5% Lilliefors Critical Value				0.325	Detected Data Not Normal at 5% Significance Level						
1458	<b>Detected Data Not Normal at 5% Significance Level</b>											
1459												
1460	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1461	KM Mean				0.00754	KM Standard Error of Mean				0.00261		
1462	KM SD				0.0114	95% KM (BCA) UCL				0.0129		
1463	95% KM (t) UCL				0.012	95% KM (Percentile Bootstrap) UCL				0.0125		
1464	95% KM (z) UCL				0.0118	95% KM Bootstrap t UCL				0.0225		
1465	90% KM Chebyshev UCL				0.0154	95% KM Chebyshev UCL				0.0189		
1466	97.5% KM Chebyshev UCL				0.0239	99% KM Chebyshev UCL				0.0335		
1467												
1468	<b>Gamma GOF Tests on Detected Observations Only</b>											
1469	A-D Test Statistic				0.687	<b>Anderson-Darling GOF Test</b>						
1470	5% A-D Critical Value				0.711	Detected data appear Gamma Distributed at 5% Significance Level						
1471	K-S Test Statistic				0.356	<b>Kolmogorov-Smirnov GOF</b>						
1472	5% K-S Critical Value				0.339	Detected Data Not Gamma Distributed at 5% Significance Level						
1473	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1474												
1475	<b>Gamma Statistics on Detected Data Only</b>											
1476	k hat (MLE)				1.253	k star (bias corrected MLE)				0.738		
1477	Theta hat (MLE)				0.0135	Theta star (bias corrected MLE)				0.023		
1478	nu hat (MLE)				15.04	nu star (bias corrected)				8.853		
1479	Mean (detects)				0.017							
1480												
1481	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1482	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1483	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1484	For such situations, GROS method may yield incorrect values of UCLs and BTVs											

	A	B	C	D	E	F	G	H	I	J	K	L
1485	This is especially true when the sample size is small.											
1486	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1487		Minimum	0.0041							Mean	0.0118	
1488		Maximum	0.06							Median	0.01	
1489		SD	0.0106							CV	0.9	
1490		k hat (MLE)	3.579							k star (bias corrected MLE)	3.141	
1491		Theta hat (MLE)	0.0033							Theta star (bias corrected MLE)	0.00376	
1492		nu hat (MLE)	164.6							nu star (bias corrected)	144.5	
1493		Adjusted Level of Significance ( $\beta$ )	0.0389									
1494		Approximate Chi Square Value (144.48, $\alpha$ )	117.7							Adjusted Chi Square Value (144.48, $\beta$ )	116	
1495		95% Gamma Approximate UCL (use when $n \geq 50$ )	0.0145							95% Gamma Adjusted UCL (use when $n < 50$ )	0.0147	
1496												
1497	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1498		Mean (KM)	0.00754							SD (KM)	0.0114	
1499		Variance (KM)	1.3046E-4							SE of Mean (KM)	0.00261	
1500		k hat (KM)	0.436							k star (KM)	0.408	
1501		nu hat (KM)	20.05							nu star (KM)	18.77	
1502		theta hat (KM)	0.0173							theta star (KM)	0.0185	
1503		80% gamma percentile (KM)	0.0122							90% gamma percentile (KM)	0.0212	
1504		95% gamma percentile (KM)	0.0311							99% gamma percentile (KM)	0.0559	
1505												
1506	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1507		Approximate Chi Square Value (18.77, $\alpha$ )	9.947							Adjusted Chi Square Value (18.77, $\beta$ )	9.483	
1508		95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.0142							95% Gamma Adjusted KM-UCL (use when $n < 50$ )	0.0149	
1509												
1510	<b>Lognormal GOF Test on Detected Observations Only</b>											
1511		Shapiro Wilk Test Statistic	0.878							<b>Shapiro Wilk GOF Test</b>		
1512		5% Shapiro Wilk Critical Value	0.788							Detected Data appear Lognormal at 5% Significance Level		
1513		Lilliefors Test Statistic	0.289							<b>Lilliefors GOF Test</b>		
1514		5% Lilliefors Critical Value	0.325							Detected Data appear Lognormal at 5% Significance Level		
1515	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1516												
1517	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1518		Mean in Original Scale	0.00659							Mean in Log Scale	-5.521	
1519		SD in Original Scale	0.012							SD in Log Scale	0.794	
1520		95% t UCL (assumes normality of ROS data)	0.0109							95% Percentile Bootstrap UCL	0.0113	
1521		95% BCA Bootstrap UCL	0.0144							95% Bootstrap t UCL	0.0249	
1522		95% H-UCL (Log ROS)	0.00805									
1523												
1524	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1525		KM Mean (logged)	-5.229							KM Geo Mean	0.00536	
1526		KM SD (logged)	0.613							95% Critical H Value (KM-Log)	2.078	
1527		KM Standard Error of Mean (logged)	0.142							95% H-UCL (KM -Log)	0.00849	
1528		KM SD (logged)	0.613							95% Critical H Value (KM-Log)	2.078	
1529		KM Standard Error of Mean (logged)	0.142									
1530												
1531	<b>DL/2 Statistics</b>											
1532	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1533		Mean in Original Scale	0.00676							Mean in Log Scale	-5.482	
1534		SD in Original Scale	0.012							SD in Log Scale	0.788	
1535		95% t UCL (Assumes normality)	0.011							95% H-Stat UCL	0.00831	
1536	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1537												

	A	B	C	D	E	F	G	H	I	J	K	L
1538	<b>Nonparametric Distribution Free UCL Statistics</b>											
1539	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											
1540												
1541	<b>Suggested UCL to Use</b>											
1542	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					0.0149						
1543												
1544	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1545	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1546												
1547	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1548	Recommendations are based upon data size, data distribution, and skewness.											
1549	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1550	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1551												
1552	<b>4,4-DDD (p,p-DDD)</b>											
1553												
1554	<b>General Statistics</b>											
1555	Total Number of Observations				22		Number of Distinct Observations				16	
1556	Number of Detects				2		Number of Non-Detects				20	
1557	Number of Distinct Detects				2		Number of Distinct Non-Detects				14	
1558	Minimum Detect				0.0086		Minimum Non-Detect				0.0059	
1559	Maximum Detect				0.015		Maximum Non-Detect				0.012	
1560	Variance Detects				2.0480E-5		Percent Non-Detects				90.91%	
1561	Mean Detects				0.0118		SD Detects				0.00453	
1562	Median Detects				0.0118		CV Detects				0.384	
1563	Skewness Detects				N/A		Kurtosis Detects				N/A	
1564	Mean of Logged Detects				-4.478		SD of Logged Detects				0.393	
1565												
1566	<b>Warning: Data set has only 2 Detected Values.</b>											
1567	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											
1568												
1569												
1570	<b>Normal GOF Test on Detects Only</b>											
1571	<b>Not Enough Data to Perform GOF Test</b>											
1572												
1573	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1574	KM Mean			0.0065		KM Standard Error of Mean			6.1309E-4			
1575	KM SD			0.00198		95% KM (BCA) UCL			N/A			
1576	95% KM (t) UCL			0.00755		95% KM (Percentile Bootstrap) UCL			N/A			
1577	95% KM (z) UCL			0.00751		95% KM Bootstrap t UCL			N/A			
1578	90% KM Chebyshev UCL			0.00834		95% KM Chebyshev UCL			0.00917			
1579	97.5% KM Chebyshev UCL			0.0103		99% KM Chebyshev UCL			0.0126			
1580												
1581	<b>Gamma GOF Tests on Detected Observations Only</b>											
1582	<b>Not Enough Data to Perform GOF Test</b>											
1583												
1584	<b>Gamma Statistics on Detected Data Only</b>											
1585	k hat (MLE)			13.26		k star (bias corrected MLE)			N/A			
1586	Theta hat (MLE)			8.9018E-4		Theta star (bias corrected MLE)			N/A			
1587	nu hat (MLE)			53.02		nu star (bias corrected)			N/A			
1588	Mean (detects)			0.0118								
1589												
1590	<b>Estimates of Gamma Parameters using KM Estimates</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1591					Mean (KM)	0.0065					SD (KM)	0.00198
1592					Variance (KM)	3.9039E-6					SE of Mean (KM)	6.1309E-4
1593					k hat (KM)	10.82					k star (KM)	9.371
1594					nu hat (KM)	475.9					nu star (KM)	412.3
1595					theta hat (KM)	6.0080E-4					theta star (KM)	6.9342E-4
1596					80% gamma percentile (KM)	0.00818					90% gamma percentile (KM)	0.00932
1597					95% gamma percentile (KM)	0.0103					99% gamma percentile (KM)	0.0124
1598												
1599	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1600											Adjusted Level of Significance ( $\beta$ )	0.0386
1601					Approximate Chi Square Value (412.31, $\alpha$ )	366.2					Adjusted Chi Square Value (412.31, $\beta$ )	363
1602					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.00732					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	0.00738
1603												
1604	<b>Lognormal GOF Test on Detected Observations Only</b>											
1605	<b>Not Enough Data to Perform GOF Test</b>											
1606												
1607	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1608					Mean in Original Scale	0.00302					Mean in Log Scale	-6.034
1609					SD in Original Scale	0.00307					SD in Log Scale	0.588
1610					95% t UCL (assumes normality of ROS data)	0.00415					95% Percentile Bootstrap UCL	0.00419
1611					95% BCA Bootstrap UCL	0.00484					95% Bootstrap t UCL	0.00777
1612					95% H-UCL (Log ROS)	0.00372						
1613												
1614	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1615					KM Mean (logged)	-5.065					KM Geo Mean	0.00632
1616					KM SD (logged)	0.211					95% Critical H Value (KM-Log)	1.781
1617					KM Standard Error of Mean (logged)	0.0668					95% H-UCL (KM -Log)	0.00701
1618					KM SD (logged)	0.211					95% Critical H Value (KM-Log)	1.781
1619					KM Standard Error of Mean (logged)	0.0668						
1620												
1621	<b>DL/2 Statistics</b>											
1622	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1623					Mean in Original Scale	0.00462					Mean in Log Scale	-5.472
1624					SD in Original Scale	0.00268					SD in Log Scale	0.398
1625					95% t UCL (Assumes normality)	0.00561					95% H-Stat UCL	0.00537
1626	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1627												
1628	<b>Nonparametric Distribution Free UCL Statistics</b>											
1629	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
1630												
1631	<b>Suggested UCL to Use</b>											
1632					95% KM (t) UCL	0.00755					KM H-UCL	0.00701
1633					95% KM (BCA) UCL	N/A						
1634	<b>Warning: One or more Recommended UCL(s) not available!</b>											
1635												
1636	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1637	Recommendations are based upon data size, data distribution, and skewness.											
1638	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1639	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1640												
1641	<b>Endrin</b>											
1642												
1643	<b>General Statistics</b>											



	A	B	C	D	E	F	G	H	I	J	K	L
1644	Total Number of Observations					22	Number of Distinct Observations					16
1645	Number of Detects					2	Number of Non-Detects					20
1646	Number of Distinct Detects					2	Number of Distinct Non-Detects					14
1647	Minimum Detect					0.0081	Minimum Non-Detect					0.0055
1648	Maximum Detect					0.028	Maximum Non-Detect					0.012
1649	Variance Detects					1.9801E-4	Percent Non-Detects					90.91%
1650	Mean Detects					0.0181	SD Detects					0.0141
1651	Median Detects					0.0181	CV Detects					0.78
1652	Skewness Detects					N/A	Kurtosis Detects					N/A
1653	Mean of Logged Detects					-4.196	SD of Logged Detects					0.877
1654												
1655	<b>Warning: Data set has only 2 Detected Values.</b>											
1656	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											
1657												
1658												
1659	<b>Normal GOF Test on Detects Only</b>											
1660	<b>Not Enough Data to Perform GOF Test</b>											
1661												
1662	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1663	KM Mean					0.00668	KM Standard Error of Mean					0.00142
1664	KM SD					0.00469	95% KM (BCA) UCL					N/A
1665	95% KM (t) UCL					0.00912	95% KM (Percentile Bootstrap) UCL					N/A
1666	95% KM (z) UCL					0.00901	95% KM Bootstrap t UCL					N/A
1667	90% KM Chebyshev UCL					0.0109	95% KM Chebyshev UCL					0.0129
1668	97.5% KM Chebyshev UCL					0.0155	99% KM Chebyshev UCL					0.0208
1669												
1670	<b>Gamma GOF Tests on Detected Observations Only</b>											
1671	<b>Not Enough Data to Perform GOF Test</b>											
1672												
1673	<b>Gamma Statistics on Detected Data Only</b>											
1674	k hat (MLE)					2.917	k star (bias corrected MLE)					N/A
1675	Theta hat (MLE)					0.00619	Theta star (bias corrected MLE)					N/A
1676	nu hat (MLE)					11.67	nu star (bias corrected)					N/A
1677	Mean (detects)					0.0181						
1678												
1679	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1680	Mean (KM)					0.00668	SD (KM)					0.00469
1681	Variance (KM)					2.2027E-5	SE of Mean (KM)					0.00142
1682	k hat (KM)					2.024	k star (KM)					1.779
1683	nu hat (KM)					89.08	nu star (KM)					78.26
1684	theta hat (KM)					0.0033	theta star (KM)					0.00375
1685	80% gamma percentile (KM)					0.0101	90% gamma percentile (KM)					0.0134
1686	95% gamma percentile (KM)					0.0164	99% gamma percentile (KM)					0.0234
1687												
1688	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1689							Adjusted Level of Significance ( $\beta$ )					0.0386
1690	Approximate Chi Square Value (78.26, $\alpha$ )					58.88	Adjusted Chi Square Value (78.26, $\beta$ )					57.63
1691	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.00888	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.00907
1692												
1693	<b>Lognormal GOF Test on Detected Observations Only</b>											
1694	<b>Not Enough Data to Perform GOF Test</b>											
1695												
1696	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1697				Mean in Original Scale		0.00194				Mean in Log Scale		-7.879
1698				SD in Original Scale		0.00606				SD in Log Scale		1.384
1699			95% t UCL (assumes normality of ROS data)			0.00416				95% Percentile Bootstrap UCL		0.00443
1700				95% BCA Bootstrap UCL		0.00579				95% Bootstrap t UCL		0.0495
1701				95% H-UCL (Log ROS)		0.00256						
1702												
1703				<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>								
1704				KM Mean (logged)		-5.106				KM Geo Mean		0.00606
1705				KM SD (logged)		0.346				95% Critical H Value (KM-Log)		1.871
1706				KM Standard Error of Mean (logged)		0.106				95% H-UCL (KM -Log)		0.00741
1707				KM SD (logged)		0.346				95% Critical H Value (KM-Log)		1.871
1708				KM Standard Error of Mean (logged)		0.106						
1709												
1710				<b>DL/2 Statistics</b>								
1711				<b>DL/2 Normal</b>				<b>DL/2 Log-Transformed</b>				
1712				Mean in Original Scale		0.00491				Mean in Log Scale		-5.528
1713				SD in Original Scale		0.00534				SD in Log Scale		0.529
1714				95% t UCL (Assumes normality)		0.00686				95% H-Stat UCL		0.00577
1715				<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>								
1716												
1717				<b>Nonparametric Distribution Free UCL Statistics</b>								
1718				<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>								
1719												
1720				<b>Suggested UCL to Use</b>								
1721				95% KM (Chebyshev) UCL		0.0129						
1722												
1723				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1724				Recommendations are based upon data size, data distribution, and skewness.								
1725				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
1726				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
1727												
1728				<b>Benzo(a)anthracene</b>								
1729												
1730				<b>General Statistics</b>								
1731				Total Number of Observations		24				Number of Distinct Observations		20
1732				Number of Detects		23				Number of Non-Detects		1
1733				Number of Distinct Detects		19				Number of Distinct Non-Detects		1
1734				Minimum Detect		0.057				Minimum Non-Detect		0.51
1735				Maximum Detect		4.5				Maximum Non-Detect		0.51
1736				Variance Detects		1.593				Percent Non-Detects		4.167%
1737				Mean Detects		1.292				SD Detects		1.262
1738				Median Detects		0.72				CV Detects		0.977
1739				Skewness Detects		1.548				Kurtosis Detects		1.482
1740				Mean of Logged Detects		-0.195				SD of Logged Detects		1.042
1741												
1742				<b>Normal GOF Test on Detects Only</b>								
1743				Shapiro Wilk Test Statistic		0.785				<b>Shapiro Wilk GOF Test</b>		
1744				5% Shapiro Wilk Critical Value		0.914				Detected Data Not Normal at 5% Significance Level		
1745				Lilliefors Test Statistic		0.23				<b>Lilliefors GOF Test</b>		
1746				5% Lilliefors Critical Value		0.18				Detected Data Not Normal at 5% Significance Level		
1747				<b>Detected Data Not Normal at 5% Significance Level</b>								
1748												
1749				<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>								

	A	B	C	D	E	F	G	H	I	J	K	L
1750					KM Mean	1.248				KM Standard Error of Mean		0.256
1751					KM SD	1.227				95% KM (BCA) UCL		1.689
1752					95% KM (t) UCL	1.687				95% KM (Percentile Bootstrap) UCL		1.682
1753					95% KM (z) UCL	1.669				95% KM Bootstrap t UCL		1.835
1754					90% KM Chebyshev UCL	2.016				95% KM Chebyshev UCL		2.365
1755					97.5% KM Chebyshev UCL	2.848				99% KM Chebyshev UCL		3.797
1756												
1757	<b>Gamma GOF Tests on Detected Observations Only</b>											
1758					A-D Test Statistic	0.476				<b>Anderson-Darling GOF Test</b>		
1759					5% A-D Critical Value	0.765				Detected data appear Gamma Distributed at 5% Significance Level		
1760					K-S Test Statistic	0.152				<b>Kolmogorov-Smirnov GOF</b>		
1761					5% K-S Critical Value	0.186				Detected data appear Gamma Distributed at 5% Significance Level		
1762	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1763												
1764	<b>Gamma Statistics on Detected Data Only</b>											
1765					k hat (MLE)	1.248				k star (bias corrected MLE)		1.114
1766					Theta hat (MLE)	1.035				Theta star (bias corrected MLE)		1.16
1767					nu hat (MLE)	57.4				nu star (bias corrected)		51.25
1768					Mean (detects)	1.292						
1769												
1770	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1771	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1772	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1773	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1774	This is especially true when the sample size is small.											
1775	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1776					Minimum	0.01				Mean		1.239
1777					Maximum	4.5				Median		0.705
1778					SD	1.262				CV		1.019
1779					k hat (MLE)	0.976				k star (bias corrected MLE)		0.882
1780					Theta hat (MLE)	1.269				Theta star (bias corrected MLE)		1.404
1781					nu hat (MLE)	46.86				nu star (bias corrected)		42.33
1782					Adjusted Level of Significance ( $\beta$ )	0.0392						
1783					Approximate Chi Square Value (42.33, $\alpha$ )	28.42				Adjusted Chi Square Value (42.33, $\beta$ )		27.62
1784					95% Gamma Approximate UCL (use when $n \geq 50$ )	1.845				95% Gamma Adjusted UCL (use when $n < 50$ )		1.899
1785												
1786	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1787					Mean (KM)	1.248				SD (KM)		1.227
1788					Variance (KM)	1.505				SE of Mean (KM)		0.256
1789					k hat (KM)	1.035				k star (KM)		0.933
1790					nu hat (KM)	49.67				nu star (KM)		44.8
1791					theta hat (KM)	1.206				theta star (KM)		1.337
1792					80% gamma percentile (KM)	2.02				90% gamma percentile (KM)		2.923
1793					95% gamma percentile (KM)	3.832				99% gamma percentile (KM)		5.952
1794												
1795	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1796					Approximate Chi Square Value (44.80, $\alpha$ )	30.44				Adjusted Chi Square Value (44.80, $\beta$ )		29.61
1797					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	1.836				95% Gamma Adjusted KM-UCL (use when $n < 50$ )		1.888
1798												
1799	<b>Lognormal GOF Test on Detected Observations Only</b>											
1800					Shapiro Wilk Test Statistic	0.961				<b>Shapiro Wilk GOF Test</b>		
1801					5% Shapiro Wilk Critical Value	0.914				Detected Data appear Lognormal at 5% Significance Level		
1802					Lilliefors Test Statistic	0.113				<b>Lilliefors GOF Test</b>		

	A	B	C	D	E	F	G	H	I	J	K	L
1803	5% Lilliefors Critical Value				0.18	Detected Data appear Lognormal at 5% Significance Level						
1804	Detected Data appear Lognormal at 5% Significance Level											
1805												
1806	Lognormal ROS Statistics Using Imputed Non-Detects											
1807	Mean in Original Scale				1.247	Mean in Log Scale				-0.251		
1808	SD in Original Scale				1.254	SD in Log Scale				1.056		
1809	95% t UCL (assumes normality of ROS data)				1.686	95% Percentile Bootstrap UCL				1.693		
1810	95% BCA Bootstrap UCL				1.741	95% Bootstrap t UCL				1.85		
1811	95% H-UCL (Log ROS)				2.416							
1812												
1813	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1814	KM Mean (logged)				-0.254	KM Geo Mean				0.775		
1815	KM SD (logged)				1.047	95% Critical H Value (KM-Log)				2.604		
1816	KM Standard Error of Mean (logged)				0.221	95% H-UCL (KM -Log)				2.367		
1817	KM SD (logged)				1.047	95% Critical H Value (KM-Log)				2.604		
1818	KM Standard Error of Mean (logged)				0.221							
1819												
1820	DL/2 Statistics											
1821	DL/2 Normal						DL/2 Log-Transformed					
1822	Mean in Original Scale				1.249	Mean in Log Scale				-0.244		
1823	SD in Original Scale				1.252	SD in Log Scale				1.047		
1824	95% t UCL (Assumes normality)				1.687	95% H-Stat UCL				2.394		
1825	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1826												
1827	Nonparametric Distribution Free UCL Statistics											
1828	Detected Data appear Gamma Distributed at 5% Significance Level											
1829												
1830	Suggested UCL to Use											
1831	95% KM Adjusted Gamma UCL				1.888	95% GROS Adjusted Gamma UCL				1.899		
1832												
1833	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1834	Recommendations are based upon data size, data distribution, and skewness.											
1835	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1836	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1837												
1838	Benzo(b)fluoranthene											
1839												
1840	General Statistics											
1841	Total Number of Observations				24	Number of Distinct Observations				22		
1842	Number of Detects				23	Number of Non-Detects				1		
1843	Number of Distinct Detects				22	Number of Distinct Non-Detects				1		
1844	Minimum Detect				0.069	Minimum Non-Detect				0.51		
1845	Maximum Detect				5	Maximum Non-Detect				0.51		
1846	Variance Detects				2.143	Percent Non-Detects				4.167%		
1847	Mean Detects				1.651	SD Detects				1.464		
1848	Median Detects				1	CV Detects				0.887		
1849	Skewness Detects				1.371	Kurtosis Detects				0.781		
1850	Mean of Logged Detects				0.114	SD of Logged Detects				0.981		
1851												
1852	Normal GOF Test on Detects Only											
1853	Shapiro Wilk Test Statistic				0.807	Shapiro Wilk GOF Test						
1854	5% Shapiro Wilk Critical Value				0.914	Detected Data Not Normal at 5% Significance Level						
1855	Lilliefors Test Statistic				0.212	Lilliefors GOF Test						

	A	B	C	D	E	F	G	H	I	J	K	L
1856	5% Lilliefors Critical Value					0.18	Detected Data Not Normal at 5% Significance Level					
1857	<b>Detected Data Not Normal at 5% Significance Level</b>											
1858												
1859	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1860	KM Mean					1.593	KM Standard Error of Mean					0.298
1861	KM SD					1.429	95% KM (BCA) UCL					2.103
1862	95% KM (t) UCL					2.104	95% KM (Percentile Bootstrap) UCL					2.094
1863	95% KM (z) UCL					2.084	95% KM Bootstrap t UCL					2.303
1864	90% KM Chebyshev UCL					2.488	95% KM Chebyshev UCL					2.893
1865	97.5% KM Chebyshev UCL					3.456	99% KM Chebyshev UCL					4.562
1866												
1867	<b>Gamma GOF Tests on Detected Observations Only</b>											
1868	A-D Test Statistic					0.464	<b>Anderson-Darling GOF Test</b>					
1869	5% A-D Critical Value					0.761	Detected data appear Gamma Distributed at 5% Significance Level					
1870	K-S Test Statistic					0.131	<b>Kolmogorov-Smirnov GOF</b>					
1871	5% K-S Critical Value					0.185	Detected data appear Gamma Distributed at 5% Significance Level					
1872	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1873												
1874	<b>Gamma Statistics on Detected Data Only</b>											
1875	k hat (MLE)					1.435	k star (bias corrected MLE)					1.277
1876	Theta hat (MLE)					1.15	Theta star (bias corrected MLE)					1.293
1877	nu hat (MLE)					66.03	nu star (bias corrected)					58.75
1878	Mean (detects)					1.651						
1879												
1880	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1881	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1882	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1883	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1884	This is especially true when the sample size is small.											
1885	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1886	Minimum					0.01	Mean					1.582
1887	Maximum					5	Median					1
1888	SD					1.47	CV					0.929
1889	k hat (MLE)					1.059	k star (bias corrected MLE)					0.954
1890	Theta hat (MLE)					1.494	Theta star (bias corrected MLE)					1.658
1891	nu hat (MLE)					50.83	nu star (bias corrected)					45.81
1892	Adjusted Level of Significance ( $\beta$ )					0.0392						
1893	Approximate Chi Square Value (45.81, $\alpha$ )					31.28	Adjusted Chi Square Value (45.81, $\beta$ )					30.44
1894	95% Gamma Approximate UCL (use when $n \geq 50$ )					2.317	95% Gamma Adjusted UCL (use when $n < 50$ )					2.382
1895												
1896	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1897	Mean (KM)					1.593	SD (KM)					1.429
1898	Variance (KM)					2.043	SE of Mean (KM)					0.298
1899	k hat (KM)					1.242	k star (KM)					1.114
1900	nu hat (KM)					59.6	nu star (KM)					53.48
1901	theta hat (KM)					1.283	theta star (KM)					1.429
1902	80% gamma percentile (KM)					2.54	90% gamma percentile (KM)					3.571
1903	95% gamma percentile (KM)					4.593	99% gamma percentile (KM)					6.949
1904												
1905	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1906	Approximate Chi Square Value (53.48, $\alpha$ )					37.68	Adjusted Chi Square Value (53.48, $\beta$ )					36.75
1907	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					2.261	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					2.318
1908												

	A	B	C	D	E	F	G	H	I	J	K	L
1909	<b>Lognormal GOF Test on Detected Observations Only</b>											
1910	Shapiro Wilk Test Statistic					0.942	<b>Shapiro Wilk GOF Test</b>					
1911	5% Shapiro Wilk Critical Value					0.914	Detected Data appear Lognormal at 5% Significance Level					
1912	Lilliefors Test Statistic					0.129	<b>Lilliefors GOF Test</b>					
1913	5% Lilliefors Critical Value					0.18	Detected Data appear Lognormal at 5% Significance Level					
1914	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1915												
1916	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1917	Mean in Original Scale					1.592	Mean in Log Scale					0.0503
1918	SD in Original Scale					1.46	SD in Log Scale					1.01
1919	95% t UCL (assumes normality of ROS data)					2.103	95% Percentile Bootstrap UCL					2.091
1920	95% BCA Bootstrap UCL					2.152	95% Bootstrap t UCL					2.234
1921	95% H-UCL (Log ROS)					2.997						
1922												
1923	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1924	KM Mean (logged)					0.043	KM Geo Mean					1.044
1925	KM SD (logged)					1.012	95% Critical H Value (KM-Log)					2.557
1926	KM Standard Error of Mean (logged)					0.215	95% H-UCL (KM -Log)					2.987
1927	KM SD (logged)					1.012	95% Critical H Value (KM-Log)					2.557
1928	KM Standard Error of Mean (logged)					0.215						
1929												
1930	<b>DL/2 Statistics</b>											
1931	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1932	Mean in Original Scale					1.593	Mean in Log Scale					0.0524
1933	SD in Original Scale					1.46	SD in Log Scale					1.006
1934	95% t UCL (Assumes normality)					2.103	95% H-Stat UCL					2.986
1935	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1936												
1937	<b>Nonparametric Distribution Free UCL Statistics</b>											
1938	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1939												
1940	<b>Suggested UCL to Use</b>											
1941	95% KM Adjusted Gamma UCL					2.318	95% GROS Adjusted Gamma UCL					2.382
1942												
1943	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1944	Recommendations are based upon data size, data distribution, and skewness.											
1945	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1946	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1947												
1948	<b>Benzo(k)fluoranthene</b>											
1949												
1950	<b>General Statistics</b>											
1951	Total Number of Observations					20	Number of Distinct Observations					18
1952	Number of Detects					18	Number of Non-Detects					2
1953	Number of Distinct Detects					16	Number of Distinct Non-Detects					2
1954	Minimum Detect					0.054	Minimum Non-Detect					0.44
1955	Maximum Detect					1.9	Maximum Non-Detect					0.51
1956	Variance Detects					0.33	Percent Non-Detects					10%
1957	Mean Detects					0.769	SD Detects					0.574
1958	Median Detects					0.505	CV Detects					0.747
1959	Skewness Detects					0.776	Kurtosis Detects					-0.84
1960	Mean of Logged Detects					-0.579	SD of Logged Detects					0.9
1961												

	A	B	C	D	E	F	G	H	I	J	K	L
1962	<b>Normal GOF Test on Detects Only</b>											
1963	Shapiro Wilk Test Statistic					0.868	<b>Shapiro Wilk GOF Test</b>					
1964	5% Shapiro Wilk Critical Value					0.897	Detected Data Not Normal at 5% Significance Level					
1965	Lilliefors Test Statistic					0.204	<b>Lilliefors GOF Test</b>					
1966	5% Lilliefors Critical Value					0.202	Detected Data Not Normal at 5% Significance Level					
1967	<b>Detected Data Not Normal at 5% Significance Level</b>											
1968												
1969	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1970	KM Mean					0.722	KM Standard Error of Mean					0.127
1971	KM SD					0.548	95% KM (BCA) UCL					0.932
1972	95% KM (t) UCL					0.941	95% KM (Percentile Bootstrap) UCL					0.925
1973	95% KM (z) UCL					0.931	95% KM Bootstrap t UCL					0.956
1974	90% KM Chebyshev UCL					1.102	95% KM Chebyshev UCL					1.274
1975	97.5% KM Chebyshev UCL					1.513	99% KM Chebyshev UCL					1.981
1976												
1977	<b>Gamma GOF Tests on Detected Observations Only</b>											
1978	A-D Test Statistic					0.481	<b>Anderson-Darling GOF Test</b>					
1979	5% A-D Critical Value					0.755	Detected data appear Gamma Distributed at 5% Significance Level					
1980	K-S Test Statistic					0.146	<b>Kolmogorov-Smirnov GOF</b>					
1981	5% K-S Critical Value					0.207	Detected data appear Gamma Distributed at 5% Significance Level					
1982	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1983												
1984	<b>Gamma Statistics on Detected Data Only</b>											
1985	k hat (MLE)					1.73	k star (bias corrected MLE)					1.479
1986	Theta hat (MLE)					0.444	Theta star (bias corrected MLE)					0.52
1987	nu hat (MLE)					62.29	nu star (bias corrected)					53.25
1988	Mean (detects)					0.769						
1989												
1990	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1991	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1992	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1993	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1994	This is especially true when the sample size is small.											
1995	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1996	Minimum					0.054	Mean					0.722
1997	Maximum					1.9	Median					0.44
1998	SD					0.562	CV					0.778
1999	k hat (MLE)					1.735	k star (bias corrected MLE)					1.508
2000	Theta hat (MLE)					0.416	Theta star (bias corrected MLE)					0.479
2001	nu hat (MLE)					69.4	nu star (bias corrected)					60.32
2002	Adjusted Level of Significance ( $\beta$ )					0.038						
2003	Approximate Chi Square Value (60.32, $\alpha$ )					43.46	Adjusted Chi Square Value (60.32, $\beta$ )					42.33
2004	95% Gamma Approximate UCL (use when $n \geq 50$ )					1.002	95% Gamma Adjusted UCL (use when $n < 50$ )					1.029
2005												
2006	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2007	Mean (KM)					0.722	SD (KM)					0.548
2008	Variance (KM)					0.301	SE of Mean (KM)					0.127
2009	k hat (KM)					1.735	k star (KM)					1.508
2010	nu hat (KM)					69.4	nu star (KM)					60.32
2011	theta hat (KM)					0.416	theta star (KM)					0.479
2012	80% gamma percentile (KM)					1.117	90% gamma percentile (KM)					1.503
2013	95% gamma percentile (KM)					1.878	99% gamma percentile (KM)					2.725
2014												

	A	B	C	D	E	F	G	H	I	J	K	L
2015	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2016	Approximate Chi Square Value (60.32, $\alpha$ )					43.46	Adjusted Chi Square Value (60.32, $\beta$ )					42.33
2017	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					1.003	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					1.029
2018												
2019	<b>Lognormal GOF Test on Detected Observations Only</b>											
2020	Shapiro Wilk Test Statistic					0.923	<b>Shapiro Wilk GOF Test</b>					
2021	5% Shapiro Wilk Critical Value					0.897	Detected Data appear Lognormal at 5% Significance Level					
2022	Lilliefors Test Statistic					0.123	<b>Lilliefors GOF Test</b>					
2023	5% Lilliefors Critical Value					0.202	Detected Data appear Lognormal at 5% Significance Level					
2024	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2025												
2026	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2027	Mean in Original Scale					0.72	Mean in Log Scale					-0.647
2028	SD in Original Scale					0.563	SD in Log Scale					0.877
2029	95% t UCL (assumes normality of ROS data)					0.938	95% Percentile Bootstrap UCL					0.936
2030	95% BCA Bootstrap UCL					0.954	95% Bootstrap t UCL					0.964
2031	95% H-UCL (Log ROS)					1.261						
2032												
2033	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2034	KM Mean (logged)					-0.653	KM Geo Mean					0.521
2035	KM SD (logged)					0.881	95% Critical H Value (KM-Log)					2.466
2036	KM Standard Error of Mean (logged)					0.209	95% H-UCL (KM -Log)					1.264
2037	KM SD (logged)					0.881	95% Critical H Value (KM-Log)					2.466
2038	KM Standard Error of Mean (logged)					0.209						
2039												
2040	<b>DL/2 Statistics</b>											
2041	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2042	Mean in Original Scale					0.715	Mean in Log Scale					-0.665
2043	SD in Original Scale					0.567	SD in Log Scale					0.892
2044	95% t UCL (Assumes normality)					0.935	95% H-Stat UCL					1.272
2045	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2046												
2047	<b>Nonparametric Distribution Free UCL Statistics</b>											
2048	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
2049												
2050	<b>Suggested UCL to Use</b>											
2051	95% KM Adjusted Gamma UCL					1.029	95% GROS Adjusted Gamma UCL					1.029
2052												
2053	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2054	Recommendations are based upon data size, data distribution, and skewness.											
2055	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2056	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2057												
2058	<b>Benzo(a)pyrene</b>											
2059												
2060	<b>General Statistics</b>											
2061	Total Number of Observations					24	Number of Distinct Observations					21
2062	Number of Detects					23	Number of Non-Detects					1
2063	Number of Distinct Detects					20	Number of Distinct Non-Detects					1
2064	Minimum Detect					0.053	Minimum Non-Detect					0.51
2065	Maximum Detect					4.1	Maximum Non-Detect					0.51
2066	Variance Detects					1.283	Percent Non-Detects					4.167%
2067	Mean Detects					1.204	SD Detects					1.133



	A	B	C	D	E	F	G	H	I	J	K	L
2068				Median Detects		0.73					CV Detects	0.941
2069				Skewness Detects		1.524					Kurtosis Detects	1.307
2070				Mean of Logged Detects		-0.229					SD of Logged Detects	1
2071												
2072	<b>Normal GOF Test on Detects Only</b>											
2073				Shapiro Wilk Test Statistic		0.783					<b>Shapiro Wilk GOF Test</b>	
2074				5% Shapiro Wilk Critical Value		0.914					Detected Data Not Normal at 5% Significance Level	
2075				Lilliefors Test Statistic		0.257					<b>Lilliefors GOF Test</b>	
2076				5% Lilliefors Critical Value		0.18					Detected Data Not Normal at 5% Significance Level	
2077	<b>Detected Data Not Normal at 5% Significance Level</b>											
2078												
2079	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2080				KM Mean		1.164					KM Standard Error of Mean	0.23
2081				KM SD		1.101					95% KM (BCA) UCL	1.515
2082				95% KM (t) UCL		1.558					95% KM (Percentile Bootstrap) UCL	1.549
2083				95% KM (z) UCL		1.542					95% KM Bootstrap t UCL	1.691
2084				90% KM Chebyshev UCL		1.854					95% KM Chebyshev UCL	2.166
2085				97.5% KM Chebyshev UCL		2.6					99% KM Chebyshev UCL	3.451
2086												
2087	<b>Gamma GOF Tests on Detected Observations Only</b>											
2088				A-D Test Statistic		0.551					<b>Anderson-Darling GOF Test</b>	
2089				5% A-D Critical Value		0.763					Detected data appear Gamma Distributed at 5% Significance Level	
2090				K-S Test Statistic		0.146					<b>Kolmogorov-Smirnov GOF</b>	
2091				5% K-S Critical Value		0.185					Detected data appear Gamma Distributed at 5% Significance Level	
2092	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
2093												
2094	<b>Gamma Statistics on Detected Data Only</b>											
2095				k hat (MLE)		1.351					k star (bias corrected MLE)	1.203
2096				Theta hat (MLE)		0.891					Theta star (bias corrected MLE)	1
2097				nu hat (MLE)		62.13					nu star (bias corrected)	55.36
2098				Mean (detects)		1.204						
2099												
2100	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2101	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2102	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2103	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2104	This is especially true when the sample size is small.											
2105	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2106				Minimum		0.0455					Mean	1.155
2107				Maximum		4.1					Median	0.725
2108				SD		1.133					CV	0.98
2109				k hat (MLE)		1.154					k star (bias corrected MLE)	1.038
2110				Theta hat (MLE)		1.001					Theta star (bias corrected MLE)	1.114
2111				nu hat (MLE)		55.39					nu star (bias corrected)	49.8
2112				Adjusted Level of Significance ( $\beta$ )		0.0392						
2113				Approximate Chi Square Value (49.80, $\alpha$ )		34.6					Adjusted Chi Square Value (49.80, $\beta$ )	33.71
2114				95% Gamma Approximate UCL (use when $n \geq 50$ )		1.663					95% Gamma Adjusted UCL (use when $n < 50$ )	1.707
2115												
2116	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2117				Mean (KM)		1.164					SD (KM)	1.101
2118				Variance (KM)		1.213					SE of Mean (KM)	0.23
2119				k hat (KM)		1.117					k star (KM)	1.005
2120				nu hat (KM)		53.61					nu star (KM)	48.24

	A	B	C	D	E	F	G	H	I	J	K	L
2121	theta hat (KM)				1.042	theta star (KM)				1.158		
2122	80% gamma percentile (KM)				1.872	90% gamma percentile (KM)				2.676		
2123	95% gamma percentile (KM)				3.48	99% gamma percentile (KM)				5.346		
2124												
2125	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2126	Approximate Chi Square Value (48.24, $\alpha$ )				33.3	Adjusted Chi Square Value (48.24, $\beta$ )				32.43		
2127	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				1.686	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				1.731		
2128												
2129	<b>Lognormal GOF Test on Detected Observations Only</b>											
2130	Shapiro Wilk Test Statistic				0.951	<b>Shapiro Wilk GOF Test</b>						
2131	5% Shapiro Wilk Critical Value				0.914	Detected Data appear Lognormal at 5% Significance Level						
2132	Lilliefors Test Statistic				0.139	<b>Lilliefors GOF Test</b>						
2133	5% Lilliefors Critical Value				0.18	Detected Data appear Lognormal at 5% Significance Level						
2134	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2135												
2136	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2137	Mean in Original Scale				1.163	Mean in Log Scale				-0.282		
2138	SD in Original Scale				1.126	SD in Log Scale				1.012		
2139	95% t UCL (assumes normality of ROS data)				1.556	95% Percentile Bootstrap UCL				1.566		
2140	95% BCA Bootstrap UCL				1.622	95% Bootstrap t UCL				1.681		
2141	95% H-UCL (Log ROS)				2.161							
2142												
2143	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2144	KM Mean (logged)				-0.285	KM Geo Mean				0.752		
2145	KM SD (logged)				1.005	95% Critical H Value (KM-Log)				2.548		
2146	KM Standard Error of Mean (logged)				0.212	95% H-UCL (KM -Log)				2.127		
2147	KM SD (logged)				1.005	95% Critical H Value (KM-Log)				2.548		
2148	KM Standard Error of Mean (logged)				0.212							
2149												
2150	<b>DL/2 Statistics</b>											
2151	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
2152	Mean in Original Scale				1.164	Mean in Log Scale				-0.276		
2153	SD in Original Scale				1.124	SD in Log Scale				1.005		
2154	95% t UCL (Assumes normality)				1.557	95% H-Stat UCL				2.145		
2155	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2156												
2157	<b>Nonparametric Distribution Free UCL Statistics</b>											
2158	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
2159												
2160	<b>Suggested UCL to Use</b>											
2161	95% KM Adjusted Gamma UCL				1.731	95% GROS Adjusted Gamma UCL				1.707		
2162												
2163	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2164	Recommendations are based upon data size, data distribution, and skewness.											
2165	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2166	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2167												
2168	<b>Chrysene</b>											
2169												
2170	<b>General Statistics</b>											
2171	Total Number of Observations				24	Number of Distinct Observations				21		
2172	Number of Detects				23	Number of Non-Detects				1		
2173	Number of Distinct Detects				20	Number of Distinct Non-Detects				1		

	A	B	C	D	E	F	G	H	I	J	K	L
2174				Minimum Detect	0.062					Minimum Non-Detect		0.51
2175				Maximum Detect	4.3					Maximum Non-Detect		0.51
2176				Variance Detects	1.473					Percent Non-Detects		4.167%
2177				Mean Detects	1.334					SD Detects		1.214
2178				Median Detects	0.76					CV Detects		0.91
2179				Skewness Detects	1.405					Kurtosis Detects		1.007
2180				Mean of Logged Detects	-0.117					SD of Logged Detects		0.995
2181												
2182	<b>Normal GOF Test on Detects Only</b>											
2183				Shapiro Wilk Test Statistic	0.812					<b>Shapiro Wilk GOF Test</b>		
2184				5% Shapiro Wilk Critical Value	0.914					Detected Data Not Normal at 5% Significance Level		
2185				Lilliefors Test Statistic	0.235					<b>Lilliefors GOF Test</b>		
2186				5% Lilliefors Critical Value	0.18					Detected Data Not Normal at 5% Significance Level		
2187	<b>Detected Data Not Normal at 5% Significance Level</b>											
2188												
2189	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2190				KM Mean	1.29					KM Standard Error of Mean		0.247
2191				KM SD	1.181					95% KM (BCA) UCL		1.707
2192				95% KM (t) UCL	1.713					95% KM (Percentile Bootstrap) UCL		1.683
2193				95% KM (z) UCL	1.696					95% KM Bootstrap t UCL		1.862
2194				90% KM Chebyshev UCL	2.03					95% KM Chebyshev UCL		2.365
2195				97.5% KM Chebyshev UCL	2.83					99% KM Chebyshev UCL		3.744
2196												
2197	<b>Gamma GOF Tests on Detected Observations Only</b>											
2198				A-D Test Statistic	0.444					<b>Anderson-Darling GOF Test</b>		
2199				5% A-D Critical Value	0.762					Detected data appear Gamma Distributed at 5% Significance Level		
2200				K-S Test Statistic	0.166					<b>Kolmogorov-Smirnov GOF</b>		
2201				5% K-S Critical Value	0.185					Detected data appear Gamma Distributed at 5% Significance Level		
2202	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
2203												
2204	<b>Gamma Statistics on Detected Data Only</b>											
2205				k hat (MLE)	1.376					k star (bias corrected MLE)		1.225
2206				Theta hat (MLE)	0.97					Theta star (bias corrected MLE)		1.089
2207				nu hat (MLE)	63.28					nu star (bias corrected)		56.36
2208				Mean (detects)	1.334							
2209												
2210	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2211	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2212	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2213	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2214	This is especially true when the sample size is small.											
2215	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2216				Minimum	0.062					Mean		1.281
2217				Maximum	4.3					Median		0.745
2218				SD	1.215					CV		0.948
2219				k hat (MLE)	1.204					k star (bias corrected MLE)		1.081
2220				Theta hat (MLE)	1.064					Theta star (bias corrected MLE)		1.185
2221				nu hat (MLE)	57.78					nu star (bias corrected)		51.89
2222				Adjusted Level of Significance ( $\beta$ )	0.0392							
2223				Approximate Chi Square Value (51.89, $\alpha$ )	36.35					Adjusted Chi Square Value (51.89, $\beta$ )		35.43
2224				95% Gamma Approximate UCL (use when $n \geq 50$ )	1.83					95% Gamma Adjusted UCL (use when $n < 50$ )		1.877
2225												
2226	<b>Estimates of Gamma Parameters using KM Estimates</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
2227					Mean (KM)	1.29					SD (KM)	1.181
2228					Variance (KM)	1.395					SE of Mean (KM)	0.247
2229					k hat (KM)	1.194					k star (KM)	1.072
2230					nu hat (KM)	57.29					nu star (KM)	51.46
2231					theta hat (KM)	1.081					theta star (KM)	1.203
2232					80% gamma percentile (KM)	2.065					90% gamma percentile (KM)	2.92
2233					95% gamma percentile (KM)	3.772					99% gamma percentile (KM)	5.739
2234												
2235	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2236	Approximate Chi Square Value (51.46, $\alpha$ )					35.99	Adjusted Chi Square Value (51.46, $\beta$ )					35.08
2237	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					1.845	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					1.893
2238												
2239	<b>Lognormal GOF Test on Detected Observations Only</b>											
2240	Shapiro Wilk Test Statistic					0.955	<b>Shapiro Wilk GOF Test</b>					
2241	5% Shapiro Wilk Critical Value					0.914	Detected Data appear Lognormal at 5% Significance Level					
2242	Lilliefors Test Statistic					0.11	<b>Lilliefors GOF Test</b>					
2243	5% Lilliefors Critical Value					0.18	Detected Data appear Lognormal at 5% Significance Level					
2244	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2245												
2246	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2247	Mean in Original Scale					1.289	Mean in Log Scale					-0.171
2248	SD in Original Scale					1.208	SD in Log Scale					1.008
2249	95% t UCL (assumes normality of ROS data)					1.711	95% Percentile Bootstrap UCL					1.712
2250	95% BCA Bootstrap UCL					1.748	95% Bootstrap t UCL					1.831
2251	95% H-UCL (Log ROS)					2.395						
2252												
2253	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2254	KM Mean (logged)					-0.173	KM Geo Mean					0.841
2255	KM SD (logged)					1	95% Critical H Value (KM-Log)					2.542
2256	KM Standard Error of Mean (logged)					0.211	95% H-UCL (KM -Log)					2.356
2257	KM SD (logged)					1	95% Critical H Value (KM-Log)					2.542
2258	KM Standard Error of Mean (logged)					0.211						
2259												
2260	<b>DL/2 Statistics</b>											
2261	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2262	Mean in Original Scale					1.289	Mean in Log Scale					-0.169
2263	SD in Original Scale					1.207	SD in Log Scale					1.006
2264	95% t UCL (Assumes normality)					1.711	95% H-Stat UCL					2.391
2265	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2266												
2267	<b>Nonparametric Distribution Free UCL Statistics</b>											
2268	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
2269												
2270	<b>Suggested UCL to Use</b>											
2271	95% KM Adjusted Gamma UCL					1.893	95% GROS Adjusted Gamma UCL					1.877
2272												
2273	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2274	Recommendations are based upon data size, data distribution, and skewness.											
2275	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2276	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2277												
2278	<b>Dibenz(a,h)anthracene</b>											
2279												

	A	B	C	D	E	F	G	H	I	J	K	L		
2280	<b>General Statistics</b>													
2281	Total Number of Observations					12	Number of Distinct Observations					12		
2282	Number of Detects					10	Number of Non-Detects					2		
2283	Number of Distinct Detects					10	Number of Distinct Non-Detects					2		
2284	Minimum Detect					0.085	Minimum Non-Detect					0.44		
2285	Maximum Detect					0.72	Maximum Non-Detect					0.51		
2286	Variance Detects					0.0677	Percent Non-Detects					16.67%		
2287	Mean Detects					0.343	SD Detects					0.26		
2288	Median Detects					0.235	CV Detects					0.76		
2289	Skewness Detects					0.497	Kurtosis Detects					-1.754		
2290	Mean of Logged Detects					-1.377	SD of Logged Detects					0.851		
2291														
2292	<b>Normal GOF Test on Detects Only</b>													
2293	Shapiro Wilk Test Statistic					0.835	<b>Shapiro Wilk GOF Test</b>							
2294	5% Shapiro Wilk Critical Value					0.842	Detected Data Not Normal at 5% Significance Level							
2295	Lilliefors Test Statistic					0.258	<b>Lilliefors GOF Test</b>							
2296	5% Lilliefors Critical Value					0.262	Detected Data appear Normal at 5% Significance Level							
2297	<b>Detected Data appear Approximate Normal at 5% Significance Level</b>													
2298														
2299	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>													
2300	KM Mean				0.314	KM Standard Error of Mean				0.0739				
2301	KM SD				0.238	95% KM (BCA) UCL				0.435				
2302	95% KM (t) UCL				0.447	95% KM (Percentile Bootstrap) UCL				0.435				
2303	95% KM (z) UCL				0.436	95% KM Bootstrap t UCL				0.477				
2304	90% KM Chebyshev UCL				0.536	95% KM Chebyshev UCL				0.636				
2305	97.5% KM Chebyshev UCL				0.775	99% KM Chebyshev UCL				1.049				
2306														
2307	<b>Gamma GOF Tests on Detected Observations Only</b>													
2308	A-D Test Statistic				0.621	<b>Anderson-Darling GOF Test</b>								
2309	5% A-D Critical Value				0.737	Detected data appear Gamma Distributed at 5% Significance Level								
2310	K-S Test Statistic				0.238	<b>Kolmogorov-Smirnov GOF</b>								
2311	5% K-S Critical Value				0.27	Detected data appear Gamma Distributed at 5% Significance Level								
2312	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>													
2313														
2314	<b>Gamma Statistics on Detected Data Only</b>													
2315	k hat (MLE)				1.785	k star (bias corrected MLE)				1.316				
2316	Theta hat (MLE)				0.192	Theta star (bias corrected MLE)				0.26				
2317	nu hat (MLE)				35.71	nu star (bias corrected)				26.33				
2318	Mean (detects)				0.343									
2319														
2320	<b>Gamma ROS Statistics using Imputed Non-Detects</b>													
2321	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs													
2322	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)													
2323	For such situations, GROS method may yield incorrect values of UCLs and BTVs													
2324	This is especially true when the sample size is small.													
2325	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates													
2326	Minimum				0.085	Mean				0.315				
2327	Maximum				0.72	Median				0.18				
2328	SD				0.244	CV				0.773				
2329	k hat (MLE)				1.936	k star (bias corrected MLE)				1.508				
2330	Theta hat (MLE)				0.163	Theta star (bias corrected MLE)				0.209				
2331	nu hat (MLE)				46.46	nu star (bias corrected)				36.18				
2332	Adjusted Level of Significance ( $\beta$ )				0.029									

	A	B	C	D	E	F	G	H	I	J	K	L
2333	Approximate Chi Square Value (36.18, $\alpha$ )					23.42	Adjusted Chi Square Value (36.18, $\beta$ )					21.86
2334	95% Gamma Approximate UCL (use when $n \geq 50$ )					0.487	95% Gamma Adjusted UCL (use when $n < 50$ )					0.522
2335												
2336	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2337	Mean (KM)					0.314	SD (KM)					0.238
2338	Variance (KM)					0.0567	SE of Mean (KM)					0.0739
2339	k hat (KM)					1.742	k star (KM)					1.362
2340	nu hat (KM)					41.82	nu star (KM)					32.7
2341	theta hat (KM)					0.18	theta star (KM)					0.231
2342	80% gamma percentile (KM)					0.491	90% gamma percentile (KM)					0.67
2343	95% gamma percentile (KM)					0.846	99% gamma percentile (KM)					1.244
2344												
2345	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2346	Approximate Chi Square Value (32.70, $\alpha$ )					20.63	Adjusted Chi Square Value (32.70, $\beta$ )					19.17
2347	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					0.498	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					0.536
2348												
2349	<b>Lognormal GOF Test on Detected Observations Only</b>											
2350	Shapiro Wilk Test Statistic					0.876	<b>Shapiro Wilk GOF Test</b>					
2351	5% Shapiro Wilk Critical Value					0.842	Detected Data appear Lognormal at 5% Significance Level					
2352	Lilliefors Test Statistic					0.204	<b>Lilliefors GOF Test</b>					
2353	5% Lilliefors Critical Value					0.262	Detected Data appear Lognormal at 5% Significance Level					
2354	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2355												
2356	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2357	Mean in Original Scale					0.313	Mean in Log Scale					-1.45
2358	SD in Original Scale					0.246	SD in Log Scale					0.789
2359	95% t UCL (assumes normality of ROS data)					0.44	95% Percentile Bootstrap UCL					0.426
2360	95% BCA Bootstrap UCL					0.44	95% Bootstrap t UCL					0.472
2361	95% H-UCL (Log ROS)					0.588						
2362												
2363	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2364	KM Mean (logged)					-1.464	KM Geo Mean					0.231
2365	KM SD (logged)					0.79	95% Critical H Value (KM-Log)					2.553
2366	KM Standard Error of Mean (logged)					0.25	95% H-UCL (KM -Log)					0.58
2367	KM SD (logged)					0.79	95% Critical H Value (KM-Log)					2.553
2368	KM Standard Error of Mean (logged)					0.25						
2369												
2370	<b>DL/2 Statistics</b>											
2371	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
2372	Mean in Original Scale					0.325	Mean in Log Scale					-1.388
2373	SD in Original Scale					0.239	SD in Log Scale					0.771
2374	95% t UCL (Assumes normality)					0.449	95% H-Stat UCL					0.604
2375	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2376												
2377	<b>Nonparametric Distribution Free UCL Statistics</b>											
2378	<b>Detected Data appear Approximate Normal Distributed at 5% Significance Level</b>											
2379												
2380	<b>Suggested UCL to Use</b>											
2381	95% KM (t) UCL					0.447						
2382												
2383	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
2384	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
2385												

	A	B	C	D	E	F	G	H	I	J	K	L
2386	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2387	Recommendations are based upon data size, data distribution, and skewness.											
2388	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2389	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2390												
2391	<b>Indeno(1,2,3-cd)pyrene</b>											
2392												
2393	<b>General Statistics</b>											
2394	Total Number of Observations				21		Number of Distinct Observations				19	
2395	Number of Detects				20		Number of Non-Detects				1	
2396	Number of Distinct Detects				19		Number of Distinct Non-Detects				1	
2397	Minimum Detect				0.041		Minimum Non-Detect				0.51	
2398	Maximum Detect				2.9		Maximum Non-Detect				0.51	
2399	Variance Detects				0.683		Percent Non-Detects				4.762%	
2400	Mean Detects				0.896		SD Detects				0.826	
2401	Median Detects				0.52		CV Detects				0.923	
2402	Skewness Detects				1.375		Kurtosis Detects				0.752	
2403	Mean of Logged Detects				-0.524		SD of Logged Detects				1.011	
2404												
2405	<b>Normal GOF Test on Detects Only</b>											
2406	Shapiro Wilk Test Statistic				0.8		<b>Shapiro Wilk GOF Test</b>					
2407	5% Shapiro Wilk Critical Value				0.905		Detected Data Not Normal at 5% Significance Level					
2408	Lilliefors Test Statistic				0.235		<b>Lilliefors GOF Test</b>					
2409	5% Lilliefors Critical Value				0.192		Detected Data Not Normal at 5% Significance Level					
2410	<b>Detected Data Not Normal at 5% Significance Level</b>											
2411												
2412	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2413	KM Mean				0.867		KM Standard Error of Mean				0.179	
2414	KM SD				0.797		95% KM (BCA) UCL				1.197	
2415	95% KM (t) UCL				1.175		95% KM (Percentile Bootstrap) UCL				1.178	
2416	95% KM (z) UCL				1.161		95% KM Bootstrap t UCL				1.273	
2417	90% KM Chebyshev UCL				1.403		95% KM Chebyshev UCL				1.646	
2418	97.5% KM Chebyshev UCL				1.982		99% KM Chebyshev UCL				2.644	
2419												
2420	<b>Gamma GOF Tests on Detected Observations Only</b>											
2421	A-D Test Statistic				0.527		<b>Anderson-Darling GOF Test</b>					
2422	5% A-D Critical Value				0.761		Detected data appear Gamma Distributed at 5% Significance Level					
2423	K-S Test Statistic				0.16		<b>Kolmogorov-Smirnov GOF</b>					
2424	5% K-S Critical Value				0.198		Detected data appear Gamma Distributed at 5% Significance Level					
2425	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
2426												
2427	<b>Gamma Statistics on Detected Data Only</b>											
2428	k hat (MLE)				1.35		k star (bias corrected MLE)				1.181	
2429	Theta hat (MLE)				0.663		Theta star (bias corrected MLE)				0.758	
2430	nu hat (MLE)				54.01		nu star (bias corrected)				47.24	
2431	Mean (detects)				0.896							
2432												
2433	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2434	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2435	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2436	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2437	This is especially true when the sample size is small.											
2438	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											

	A	B	C	D	E	F	G	H	I	J	K	L	
2439					Minimum	0.041					Mean	0.862	
2440					Maximum	2.9					Median	0.52	
2441					SD	0.82					CV	0.952	
2442					k hat (MLE)	1.302					k star (bias corrected MLE)	1.148	
2443					Theta hat (MLE)	0.662					Theta star (bias corrected MLE)	0.751	
2444					nu hat (MLE)	54.69					nu star (bias corrected)	48.21	
2445					Adjusted Level of Significance ( $\beta$ )	0.0383							
2446					Approximate Chi Square Value (48.21, $\alpha$ )	33.27					Adjusted Chi Square Value (48.21, $\beta$ )	32.32	
2447					95% Gamma Approximate UCL (use when $n \geq 50$ )	1.249					95% Gamma Adjusted UCL (use when $n < 50$ )	1.285	
2448													
2449					<b>Estimates of Gamma Parameters using KM Estimates</b>								
2450					Mean (KM)	0.867					SD (KM)	0.797	
2451					Variance (KM)	0.635					SE of Mean (KM)	0.179	
2452					k hat (KM)	1.185					k star (KM)	1.047	
2453					nu hat (KM)	49.76					nu star (KM)	43.99	
2454					theta hat (KM)	0.732					theta star (KM)	0.828	
2455					80% gamma percentile (KM)	1.391					90% gamma percentile (KM)	1.974	
2456					95% gamma percentile (KM)	2.556					99% gamma percentile (KM)	3.903	
2457													
2458					<b>Gamma Kaplan-Meier (KM) Statistics</b>								
2459					Approximate Chi Square Value (43.99, $\alpha$ )	29.78					Adjusted Chi Square Value (43.99, $\beta$ )	28.88	
2460					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	1.281					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	1.321	
2461													
2462					<b>Lognormal GOF Test on Detected Observations Only</b>								
2463					Shapiro Wilk Test Statistic	0.943					<b>Shapiro Wilk GOF Test</b>		
2464					5% Shapiro Wilk Critical Value	0.905					Detected Data appear Lognormal at 5% Significance Level		
2465					Lilliefors Test Statistic	0.117					<b>Lilliefors GOF Test</b>		
2466					5% Lilliefors Critical Value	0.192					Detected Data appear Lognormal at 5% Significance Level		
2467					<b>Detected Data appear Lognormal at 5% Significance Level</b>								
2468													
2469					<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>								
2470					Mean in Original Scale	0.865					Mean in Log Scale	-0.567	
2471					SD in Original Scale	0.818					SD in Log Scale	1.004	
2472					95% t UCL (assumes normality of ROS data)	1.172					95% Percentile Bootstrap UCL	1.158	
2473					95% BCA Bootstrap UCL	1.234					95% Bootstrap t UCL	1.291	
2474					95% H-UCL (Log ROS)	1.672							
2475													
2476					<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>								
2477					KM Mean (logged)	-0.566					KM Geo Mean	0.568	
2478					KM SD (logged)	0.993					95% Critical H Value (KM-Log)	2.554	
2479					KM Standard Error of Mean (logged)	0.226					95% H-UCL (KM -Log)	1.639	
2480					KM SD (logged)	0.993					95% Critical H Value (KM-Log)	2.554	
2481					KM Standard Error of Mean (logged)	0.226							
2482													
2483					<b>DL/2 Statistics</b>								
2484					<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>		
2485					Mean in Original Scale	0.865					Mean in Log Scale	-0.564	
2486					SD in Original Scale	0.818					SD in Log Scale	1.002	
2487					95% t UCL (Assumes normality)	1.173					95% H-Stat UCL	1.67	
2488					<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>								
2489													
2490					<b>Nonparametric Distribution Free UCL Statistics</b>								
2491					<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>								



	A	B	C	D	E	F	G	H	I	J	K	L
2492												
2493	<b>Suggested UCL to Use</b>											
2494	95% KM Adjusted Gamma UCL					1.321	95% GROS Adjusted Gamma UCL					1.285
2495												
2496	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2497	Recommendations are based upon data size, data distribution, and skewness.											
2498	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2499	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2500												
2501	<b>Phenanthrene</b>											
2502												
2503	<b>General Statistics</b>											
2504	Total Number of Observations				24	Number of Distinct Observations				24		
2505	Number of Detects				23	Number of Non-Detects				1		
2506	Number of Distinct Detects				23	Number of Distinct Non-Detects				1		
2507	Minimum Detect				0.07	Minimum Non-Detect				0.51		
2508	Maximum Detect				8.6	Maximum Non-Detect				0.51		
2509	Variance Detects				4.929	Percent Non-Detects				4.167%		
2510	Mean Detects				1.86	SD Detects				2.22		
2511	Median Detects				0.87	CV Detects				1.193		
2512	Skewness Detects				2.006	Kurtosis Detects				3.529		
2513	Mean of Logged Detects				0.0324	SD of Logged Detects				1.152		
2514												
2515	<b>Normal GOF Test on Detects Only</b>											
2516	Shapiro Wilk Test Statistic				0.72	<b>Shapiro Wilk GOF Test</b>						
2517	5% Shapiro Wilk Critical Value				0.914	Detected Data Not Normal at 5% Significance Level						
2518	Lilliefors Test Statistic				0.233	<b>Lilliefors GOF Test</b>						
2519	5% Lilliefors Critical Value				0.18	Detected Data Not Normal at 5% Significance Level						
2520	<b>Detected Data Not Normal at 5% Significance Level</b>											
2521												
2522	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2523	KM Mean			1.796	KM Standard Error of Mean			0.448				
2524	KM SD			2.148	95% KM (BCA) UCL			2.578				
2525	95% KM (t) UCL			2.564	95% KM (Percentile Bootstrap) UCL			2.551				
2526	95% KM (z) UCL			2.533	95% KM Bootstrap t UCL			2.991				
2527	90% KM Chebyshev UCL			3.141	95% KM Chebyshev UCL			3.75				
2528	97.5% KM Chebyshev UCL			4.596	99% KM Chebyshev UCL			6.258				
2529												
2530	<b>Gamma GOF Tests on Detected Observations Only</b>											
2531	A-D Test Statistic			0.566	<b>Anderson-Darling GOF Test</b>							
2532	5% A-D Critical Value			0.77	Detected data appear Gamma Distributed at 5% Significance Level							
2533	K-S Test Statistic			0.178	<b>Kolmogorov-Smirnov GOF</b>							
2534	5% K-S Critical Value			0.187	Detected data appear Gamma Distributed at 5% Significance Level							
2535	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
2536												
2537	<b>Gamma Statistics on Detected Data Only</b>											
2538	k hat (MLE)			0.983	k star (bias corrected MLE)			0.884				
2539	Theta hat (MLE)			1.893	Theta star (bias corrected MLE)			2.105				
2540	nu hat (MLE)			45.22	nu star (bias corrected)			40.65				
2541	Mean (detects)			1.86								
2542												
2543	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2544	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											

	A	B	C	D	E	F	G	H	I	J	K	L
2545	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2546	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2547	This is especially true when the sample size is small.											
2548	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2549	Minimum				0.01		Mean				1.783	
2550	Maximum				8.6		Median				0.85	
2551	SD				2.204		CV				1.236	
2552	k hat (MLE)				0.802		k star (bias corrected MLE)				0.73	
2553	Theta hat (MLE)				2.222		Theta star (bias corrected MLE)				2.443	
2554	nu hat (MLE)				38.52		nu star (bias corrected)				35.04	
2555	Adjusted Level of Significance ( $\beta$ )				0.0392							
2556	Approximate Chi Square Value (35.04, $\alpha$ )				22.49		Adjusted Chi Square Value (35.04, $\beta$ )				21.79	
2557	95% Gamma Approximate UCL (use when $n \geq 50$ )				2.778		95% Gamma Adjusted UCL (use when $n < 50$ )				2.868	
2558												
2559	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2560	Mean (KM)				1.796		SD (KM)				2.148	
2561	Variance (KM)				4.616		SE of Mean (KM)				0.448	
2562	k hat (KM)				0.698		k star (KM)				0.639	
2563	nu hat (KM)				33.53		nu star (KM)				30.67	
2564	theta hat (KM)				2.571		theta star (KM)				2.81	
2565	80% gamma percentile (KM)				2.958		90% gamma percentile (KM)				4.604	
2566	95% gamma percentile (KM)				6.316		99% gamma percentile (KM)				10.44	
2567												
2568	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2569	Approximate Chi Square Value (30.67, $\alpha$ )				19.02		Adjusted Chi Square Value (30.67, $\beta$ )				18.37	
2570	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				2.895		95% Gamma Adjusted KM-UCL (use when $n < 50$ )				2.997	
2571												
2572	<b>Lognormal GOF Test on Detected Observations Only</b>											
2573	Shapiro Wilk Test Statistic				0.981		<b>Shapiro Wilk GOF Test</b>					
2574	5% Shapiro Wilk Critical Value				0.914		Detected Data appear Lognormal at 5% Significance Level					
2575	Lilliefors Test Statistic				0.113		<b>Lilliefors GOF Test</b>					
2576	5% Lilliefors Critical Value				0.18		Detected Data appear Lognormal at 5% Significance Level					
2577	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2578												
2579	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2580	Mean in Original Scale				1.794		Mean in Log Scale				-0.0248	
2581	SD in Original Scale				2.196		SD in Log Scale				1.161	
2582	95% t UCL (assumes normality of ROS data)				2.562		95% Percentile Bootstrap UCL				2.557	
2583	95% BCA Bootstrap UCL				2.746		95% Bootstrap t UCL				3.059	
2584	95% H-UCL (Log ROS)				3.736							
2585												
2586	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2587	KM Mean (logged)				-0.0253		KM Geo Mean				0.975	
2588	KM SD (logged)				1.145		95% Critical H Value (KM-Log)				2.74	
2589	KM Standard Error of Mean (logged)				0.241		95% H-UCL (KM -Log)				3.61	
2590	KM SD (logged)				1.145		95% Critical H Value (KM-Log)				2.74	
2591	KM Standard Error of Mean (logged)				0.241							
2592												
2593	<b>DL/2 Statistics</b>											
2594	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2595	Mean in Original Scale				1.794		Mean in Log Scale				-0.0259	
2596	SD in Original Scale				2.196		SD in Log Scale				1.162	
2597	95% t UCL (Assumes normality)				2.562		95% H-Stat UCL				3.742	

	A	B	C	D	E	F	G	H	I	J	K	L
2598	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2599												
2600	<b>Nonparametric Distribution Free UCL Statistics</b>											
2601	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
2602												
2603	<b>Suggested UCL to Use</b>											
2604	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					2.997						
2605												
2606	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2607	Recommendations are based upon data size, data distribution, and skewness.											
2608	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2609	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2610												

	A	B	C	D	E	F	G	H	I	J	K	L
1	<b>UCL Statistics for Data Sets with Non-Detects</b>											
2												
3	User Selected Options											
4	Date/Time of Computation		ProUCL 5.12/10/2020 9:55:33 PM									
5	From File		Area C_D_allsoil_prouclin.xls									
6	Full Precision		OFF									
7	Confidence Coefficient		95%									
8	Number of Bootstrap Operations		2000									
9												
10												
11	<b>Aluminum</b>											
12												
13	<b>General Statistics</b>											
14	Total Number of Observations				39		Number of Distinct Observations				36	
15							Number of Missing Observations				0	
16	Minimum				98		Mean				12764	
17	Maximum				60500		Median				10700	
18	SD				9794		Std. Error of Mean				1568	
19	Coefficient of Variation				0.767		Skewness				3.147	
20												
21	<b>Normal GOF Test</b>											
22	Shapiro Wilk Test Statistic				0.735		<b>Shapiro Wilk GOF Test</b>					
23	5% Shapiro Wilk Critical Value				0.939		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.151		<b>Lilliefors GOF Test</b>					
25	5% Lilliefors Critical Value				0.14		Data Not Normal at 5% Significance Level					
26	<b>Data Not Normal at 5% Significance Level</b>											
27												
28	<b>Assuming Normal Distribution</b>											
29	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
30	95% Student's-t UCL				15408		95% Adjusted-CLT UCL (Chen-1995)				16187	
31							95% Modified-t UCL (Johnson-1978)				15539	
32												
33	<b>Gamma GOF Test</b>											
34	A-D Test Statistic				0.811		<b>Anderson-Darling Gamma GOF Test</b>					
35	5% A-D Critical Value				0.759		Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.112		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
37	5% K-S Critical Value				0.143		Detected data appear Gamma Distributed at 5% Significance Level					
38	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
39												
40	<b>Gamma Statistics</b>											
41	k hat (MLE)				1.979		k star (bias corrected MLE)				1.844	
42	Theta hat (MLE)				6450		Theta star (bias corrected MLE)				6923	
43	nu hat (MLE)				154.3		nu star (bias corrected)				143.8	
44	MLE Mean (bias corrected)				12764		MLE Sd (bias corrected)				9400	
45							Approximate Chi Square Value (0.05)				117.1	
46	Adjusted Level of Significance				0.0437		Adjusted Chi Square Value				116.1	
47												
48	<b>Assuming Gamma Distribution</b>											
49	95% Approximate Gamma UCL (use when n>=50)				15675		95% Adjusted Gamma UCL (use when n<50)				15803	
50												
51	<b>Lognormal GOF Test</b>											
52	Shapiro Wilk Test Statistic				0.757		<b>Shapiro Wilk Lognormal GOF Test</b>					
53	5% Shapiro Wilk Critical Value				0.939		Data Not Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
54	Lilliefors Test Statistic					0.167	Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value					0.14	Data Not Lognormal at 5% Significance Level					
56	Data Not Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data					4.585	Mean of logged Data					9.181
60	Maximum of Logged Data					11.01	SD of logged Data					0.948
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL					21820	90% Chebyshev (MVUE) UCL					22822
64	95% Chebyshev (MVUE) UCL					26376	97.5% Chebyshev (MVUE) UCL					31310
65	99% Chebyshev (MVUE) UCL					41000						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL					15343	95% Jackknife UCL					15408
72	95% Standard Bootstrap UCL					15351	95% Bootstrap-t UCL					16685
73	95% Hall's Bootstrap UCL					27533	95% Percentile Bootstrap UCL					15421
74	95% BCA Bootstrap UCL					16598						
75	90% Chebyshev(Mean, Sd) UCL					17468	95% Chebyshev(Mean, Sd) UCL					19599
76	97.5% Chebyshev(Mean, Sd) UCL					22557	99% Chebyshev(Mean, Sd) UCL					28367
77												
78	Suggested UCL to Use											
79	95% Adjusted Gamma UCL					15803						
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												
89	Antimony											
90												
91	General Statistics											
92	Total Number of Observations					23	Number of Distinct Observations					23
93	Number of Detects					20	Number of Non-Detects					3
94	Number of Distinct Detects					20	Number of Distinct Non-Detects					3
95	Minimum Detect					1.2	Minimum Non-Detect					3
96	Maximum Detect					33.2	Maximum Non-Detect					7.6
97	Variance Detects					48.54	Percent Non-Detects					13.04%
98	Mean Detects					5.07	SD Detects					6.967
99	Median Detects					3.05	CV Detects					1.374
100	Skewness Detects					3.799	Kurtosis Detects					15.71
101	Mean of Logged Detects					1.219	SD of Logged Detects					0.807
102												
103	Normal GOF Test on Detects Only											
104	Shapiro Wilk Test Statistic					0.506	Shapiro Wilk GOF Test					
105	5% Shapiro Wilk Critical Value					0.905	Detected Data Not Normal at 5% Significance Level					
106	Lilliefors Test Statistic					0.291	Lilliefors GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
107	5% Lilliefors Critical Value					0.192	Detected Data Not Normal at 5% Significance Level						
108	<b>Detected Data Not Normal at 5% Significance Level</b>												
109													
110	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
111	KM Mean				4.762	KM Standard Error of Mean				1.375			
112	KM SD				6.406	95% KM (BCA) UCL				7.148			
113	95% KM (t) UCL				7.124	95% KM (Percentile Bootstrap) UCL				7.312			
114	95% KM (z) UCL				7.024	95% KM Bootstrap t UCL				11			
115	90% KM Chebyshev UCL				8.888	95% KM Chebyshev UCL				10.76			
116	97.5% KM Chebyshev UCL				13.35	99% KM Chebyshev UCL				18.45			
117													
118	<b>Gamma GOF Tests on Detected Observations Only</b>												
119	A-D Test Statistic				1.091	<b>Anderson-Darling GOF Test</b>							
120	5% A-D Critical Value				0.76	Detected Data Not Gamma Distributed at 5% Significance Level							
121	K-S Test Statistic				0.17	<b>Kolmogorov-Smirnov GOF</b>							
122	5% K-S Critical Value				0.198	Detected data appear Gamma Distributed at 5% Significance Level							
123	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>												
124													
125	<b>Gamma Statistics on Detected Data Only</b>												
126	k hat (MLE)				1.379	k star (bias corrected MLE)				1.205			
127	Theta hat (MLE)				3.678	Theta star (bias corrected MLE)				4.207			
128	nu hat (MLE)				55.14	nu star (bias corrected)				48.2			
129	Mean (detects)				5.07								
130													
131	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
132	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
133	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
134	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
135	This is especially true when the sample size is small.												
136	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
137	Minimum				0.729	Mean				4.669			
138	Maximum				33.2	Median				2.76			
139	SD				6.569	CV				1.407			
140	k hat (MLE)				1.359	k star (bias corrected MLE)				1.211			
141	Theta hat (MLE)				3.436	Theta star (bias corrected MLE)				3.856			
142	nu hat (MLE)				62.51	nu star (bias corrected)				55.69			
143	Adjusted Level of Significance ( $\beta$ )				0.0389								
144	Approximate Chi Square Value (55.69, $\alpha$ )				39.54	Adjusted Chi Square Value (55.69, $\beta$ )				38.56			
145	95% Gamma Approximate UCL (use when $n \geq 50$ )				6.576	95% Gamma Adjusted UCL (use when $n < 50$ )				6.744			
146													
147	<b>Estimates of Gamma Parameters using KM Estimates</b>												
148	Mean (KM)				4.762	SD (KM)				6.406			
149	Variance (KM)				41.04	SE of Mean (KM)				1.375			
150	k hat (KM)				0.553	k star (KM)				0.509			
151	nu hat (KM)				25.42	nu star (KM)				23.44			
152	theta hat (KM)				8.618	theta star (KM)				9.347			
153	80% gamma percentile (KM)				7.827	90% gamma percentile (KM)				12.83			
154	95% gamma percentile (KM)				18.17	99% gamma percentile (KM)				31.27			
155													
156	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
157	Approximate Chi Square Value (23.44, $\alpha$ )				13.42	Adjusted Chi Square Value (23.44, $\beta$ )				12.87			
158	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				8.316	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				8.67			
159													

	A	B	C	D	E	F	G	H	I	J	K	L	
160	<b>Lognormal GOF Test on Detected Observations Only</b>												
161	Shapiro Wilk Test Statistic				0.919	<b>Shapiro Wilk GOF Test</b>							
162	5% Shapiro Wilk Critical Value				0.905	Detected Data appear Lognormal at 5% Significance Level							
163	Lilliefors Test Statistic				0.112	<b>Lilliefors GOF Test</b>							
164	5% Lilliefors Critical Value				0.192	Detected Data appear Lognormal at 5% Significance Level							
165	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
166													
167	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
168	Mean in Original Scale				4.741	Mean in Log Scale				1.18			
169	SD in Original Scale				6.534	SD in Log Scale				0.76			
170	95% t UCL (assumes normality of ROS data)				7.081	95% Percentile Bootstrap UCL				7.036			
171	95% BCA Bootstrap UCL				8.62	95% Bootstrap t UCL				11.12			
172	95% H-UCL (Log ROS)				6.235								
173													
174	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
175	KM Mean (logged)				1.172	KM Geo Mean				3.228			
176	KM SD (logged)				0.765	95% Critical H Value (KM-Log)				2.239			
177	KM Standard Error of Mean (logged)				0.168	95% H-UCL (KM -Log)				6.232			
178	KM SD (logged)				0.765	95% Critical H Value (KM-Log)				2.239			
179	KM Standard Error of Mean (logged)				0.168								
180													
181	<b>DL/2 Statistics</b>												
182	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>						
183	Mean in Original Scale				4.787	Mean in Log Scale				1.189			
184	SD in Original Scale				6.528	SD in Log Scale				0.769			
185	95% t UCL (Assumes normality)				7.124	95% H-Stat UCL				6.375			
186	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
187													
188	<b>Nonparametric Distribution Free UCL Statistics</b>												
189	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>												
190													
191	<b>Suggested UCL to Use</b>												
192	95% KM Adjusted Gamma UCL				8.67	95% GROS Adjusted Gamma UCL				6.744			
193													
194	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test												
195	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL												
196													
197	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
198	Recommendations are based upon data size, data distribution, and skewness.												
199	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
200	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
201													
202	<b>Arsenic</b>												
203													
204	<b>General Statistics</b>												
205	Total Number of Observations				38	Number of Distinct Observations				35			
206	Number of Detects				37	Number of Non-Detects				1			
207	Number of Distinct Detects				34	Number of Distinct Non-Detects				1			
208	Minimum Detect				3.5	Minimum Non-Detect				0.8			
209	Maximum Detect				32.7	Maximum Non-Detect				0.8			
210	Variance Detects				51.19	Percent Non-Detects				2.632%			
211	Mean Detects				13.79	SD Detects				7.155			
212	Median Detects				13	CV Detects				0.519			

	A	B	C	D	E	F	G	H	I	J	K	L
213	Skewness Detects				0.91	Kurtosis Detects				0.602		
214	Mean of Logged Detects				2.492	SD of Logged Detects				0.532		
215												
216	<b>Normal GOF Test on Detects Only</b>											
217	Shapiro Wilk Test Statistic				0.914	<b>Shapiro Wilk GOF Test</b>						
218	5% Shapiro Wilk Critical Value				0.936	Detected Data Not Normal at 5% Significance Level						
219	Lilliefors Test Statistic				0.12	<b>Lilliefors GOF Test</b>						
220	5% Lilliefors Critical Value				0.144	Detected Data appear Normal at 5% Significance Level						
221	<b>Detected Data appear Approximate Normal at 5% Significance Level</b>											
222												
223	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
224	KM Mean				13.45	KM Standard Error of Mean				1.195		
225	KM SD				7.268	95% KM (BCA) UCL				15.49		
226	95% KM (t) UCL				15.47	95% KM (Percentile Bootstrap) UCL				15.38		
227	95% KM (z) UCL				15.42	95% KM Bootstrap t UCL				15.7		
228	90% KM Chebyshev UCL				17.04	95% KM Chebyshev UCL				18.66		
229	97.5% KM Chebyshev UCL				20.91	99% KM Chebyshev UCL				25.34		
230												
231	<b>Gamma GOF Tests on Detected Observations Only</b>											
232	A-D Test Statistic				0.486	<b>Anderson-Darling GOF Test</b>						
233	5% A-D Critical Value				0.753	Detected data appear Gamma Distributed at 5% Significance Level						
234	K-S Test Statistic				0.117	<b>Kolmogorov-Smirnov GOF</b>						
235	5% K-S Critical Value				0.146	Detected data appear Gamma Distributed at 5% Significance Level						
236	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
237												
238	<b>Gamma Statistics on Detected Data Only</b>											
239	k hat (MLE)				3.942	k star (bias corrected MLE)				3.64		
240	Theta hat (MLE)				3.499	Theta star (bias corrected MLE)				3.789		
241	nu hat (MLE)				291.7	nu star (bias corrected)				269.4		
242	Mean (detects)				13.79							
243												
244	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
245	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
246	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
247	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
248	This is especially true when the sample size is small.											
249	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
250	Minimum				1.459	Mean				13.47		
251	Maximum				32.7	Median				12.9		
252	SD				7.336	CV				0.545		
253	k hat (MLE)				3.206	k star (bias corrected MLE)				2.97		
254	Theta hat (MLE)				4.201	Theta star (bias corrected MLE)				4.534		
255	nu hat (MLE)				243.6	nu star (bias corrected)				225.7		
256	Adjusted Level of Significance ( $\beta$ )				0.0434							
257	Approximate Chi Square Value (225.74, $\alpha$ )				192	Adjusted Chi Square Value (225.74, $\beta$ )				190.7		
258	95% Gamma Approximate UCL (use when $n \geq 50$ )				15.84	95% Gamma Adjusted UCL (use when $n < 50$ )				15.94		
259												
260	<b>Estimates of Gamma Parameters using KM Estimates</b>											
261	Mean (KM)				13.45	SD (KM)				7.268		
262	Variance (KM)				52.82	SE of Mean (KM)				1.195		
263	k hat (KM)				3.425	k star (KM)				3.172		
264	nu hat (KM)				260.3	nu star (KM)				241.1		
265	theta hat (KM)				3.927	theta star (KM)				4.24		



	A	B	C	D	E	F	G	H	I	J	K	L
266	80% gamma percentile (KM)				19.06	90% gamma percentile (KM)				23.58		
267	95% gamma percentile (KM)				27.78	99% gamma percentile (KM)				36.87		
268												
269	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
270	Approximate Chi Square Value (241.07, $\alpha$ )				206.1	Adjusted Chi Square Value (241.07, $\beta$ )				204.8		
271	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				15.73	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				15.83		
272												
273	<b>Lognormal GOF Test on Detected Observations Only</b>											
274	Shapiro Wilk Test Statistic				0.966	<b>Shapiro Wilk GOF Test</b>						
275	5% Shapiro Wilk Critical Value				0.936	Detected Data appear Lognormal at 5% Significance Level						
276	Lilliefors Test Statistic				0.105	<b>Lilliefors GOF Test</b>						
277	5% Lilliefors Critical Value				0.144	Detected Data appear Lognormal at 5% Significance Level						
278	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
279												
280	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
281	Mean in Original Scale				13.51	Mean in Log Scale				2.456		
282	SD in Original Scale				7.266	SD in Log Scale				0.568		
283	95% t UCL (assumes normality of ROS data)				15.5	95% Percentile Bootstrap UCL				15.52		
284	95% BCA Bootstrap UCL				15.6	95% Bootstrap t UCL				15.8		
285	95% H-UCL (Log ROS)				16.48							
286												
287	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
288	KM Mean (logged)				2.42	KM Geo Mean				11.25		
289	KM SD (logged)				0.676	95% Critical H Value (KM-Log)				2.061		
290	KM Standard Error of Mean (logged)				0.111	95% H-UCL (KM -Log)				17.77		
291	KM SD (logged)				0.676	95% Critical H Value (KM-Log)				2.061		
292	KM Standard Error of Mean (logged)				0.111							
293												
294	<b>DL/2 Statistics</b>											
295	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
296	Mean in Original Scale				13.44	Mean in Log Scale				2.402		
297	SD in Original Scale				7.384	SD in Log Scale				0.762		
298	95% t UCL (Assumes normality)				15.46	95% H-Stat UCL				19.32		
299	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
300												
301	<b>Nonparametric Distribution Free UCL Statistics</b>											
302	<b>Detected Data appear Approximate Normal Distributed at 5% Significance Level</b>											
303												
304	<b>Suggested UCL to Use</b>											
305	95% KM (t) UCL				15.47							
306												
307	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
308	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
309												
310	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
311	Recommendations are based upon data size, data distribution, and skewness.											
312	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
313	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
314												
315												
316	<b>Barium</b>											
317												
318	<b>General Statistics</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
319	Total Number of Observations					39	Number of Distinct Observations					37
320							Number of Missing Observations					0
321	Minimum					4.82	Mean					333.9
322	Maximum					2150	Median					225
323	SD					362.6	Std. Error of Mean					58.07
324	Coefficient of Variation					1.086	Skewness					3.685
325												
326	<b>Normal GOF Test</b>											
327	Shapiro Wilk Test Statistic					0.611	<b>Shapiro Wilk GOF Test</b>					
328	5% Shapiro Wilk Critical Value					0.939	Data Not Normal at 5% Significance Level					
329	Lilliefors Test Statistic					0.269	<b>Lilliefors GOF Test</b>					
330	5% Lilliefors Critical Value					0.14	Data Not Normal at 5% Significance Level					
331	<b>Data Not Normal at 5% Significance Level</b>											
332												
333	<b>Assuming Normal Distribution</b>											
334	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
335	95% Student's-t UCL					431.8	95% Adjusted-CLT UCL (Chen-1995)					466
336							95% Modified-t UCL (Johnson-1978)					437.5
337												
338	<b>Gamma GOF Test</b>											
339	A-D Test Statistic					1.527	<b>Anderson-Darling Gamma GOF Test</b>					
340	5% A-D Critical Value					0.766	Data Not Gamma Distributed at 5% Significance Level					
341	K-S Test Statistic					0.156	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
342	5% K-S Critical Value					0.144	Data Not Gamma Distributed at 5% Significance Level					
343	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
344												
345	<b>Gamma Statistics</b>											
346	k hat (MLE)					1.503	k star (bias corrected MLE)					1.405
347	Theta hat (MLE)					222.1	Theta star (bias corrected MLE)					237.7
348	nu hat (MLE)					117.3	nu star (bias corrected)					109.6
349	MLE Mean (bias corrected)					333.9	MLE Sd (bias corrected)					281.7
350							Approximate Chi Square Value (0.05)					86.42
351	Adjusted Level of Significance					0.0437	Adjusted Chi Square Value					85.6
352												
353	<b>Assuming Gamma Distribution</b>											
354	95% Approximate Gamma UCL (use when n>=50))					423.3	95% Adjusted Gamma UCL (use when n<50)					427.4
355												
356	<b>Lognormal GOF Test</b>											
357	Shapiro Wilk Test Statistic					0.865	<b>Shapiro Wilk Lognormal GOF Test</b>					
358	5% Shapiro Wilk Critical Value					0.939	Data Not Lognormal at 5% Significance Level					
359	Lilliefors Test Statistic					0.195	<b>Lilliefors Lognormal GOF Test</b>					
360	5% Lilliefors Critical Value					0.14	Data Not Lognormal at 5% Significance Level					
361	<b>Data Not Lognormal at 5% Significance Level</b>											
362												
363	<b>Lognormal Statistics</b>											
364	Minimum of Logged Data					1.573	Mean of logged Data					5.443
365	Maximum of Logged Data					7.673	SD of logged Data					0.954
366												
367	<b>Assuming Lognormal Distribution</b>											
368	95% H-UCL					524	90% Chebyshev (MVUE) UCL					547.6
369	95% Chebyshev (MVUE) UCL					633.3	97.5% Chebyshev (MVUE) UCL					752.2
370	99% Chebyshev (MVUE) UCL					985.9						
371												

	A	B	C	D	E	F	G	H	I	J	K	L	
372	<b>Nonparametric Distribution Free UCL Statistics</b>												
373	<b>Data do not follow a Discernible Distribution (0.05)</b>												
374													
375	<b>Nonparametric Distribution Free UCLs</b>												
376	95% CLT UCL				429.4		95% Jackknife UCL				431.8		
377	95% Standard Bootstrap UCL				428.4		95% Bootstrap-t UCL				513.9		
378	95% Hall's Bootstrap UCL				819.9		95% Percentile Bootstrap UCL				435.9		
379	95% BCA Bootstrap UCL				473.5								
380	90% Chebyshev(Mean, Sd) UCL				508.1		95% Chebyshev(Mean, Sd) UCL				587		
381	97.5% Chebyshev(Mean, Sd) UCL				696.5		99% Chebyshev(Mean, Sd) UCL				911.6		
382													
383	<b>Suggested UCL to Use</b>												
384	95% Chebyshev (Mean, Sd) UCL				587								
385													
386	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
387	Recommendations are based upon data size, data distribution, and skewness.												
388	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
389	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
390													
391													
392	<b>Cadmium</b>												
393													
394	<b>General Statistics</b>												
395	Total Number of Observations				39		Number of Distinct Observations				38		
396									Number of Missing Observations				0
397	Minimum				0.1		Mean				3.399		
398	Maximum				24		Median				1.5		
399	SD				5.481		Std. Error of Mean				0.878		
400	Coefficient of Variation				1.612		Skewness				2.852		
401													
402	<b>Normal GOF Test</b>												
403	Shapiro Wilk Test Statistic				0.532		<b>Shapiro Wilk GOF Test</b>						
404	5% Shapiro Wilk Critical Value				0.939		Data Not Normal at 5% Significance Level						
405	Lilliefors Test Statistic				0.367		<b>Lilliefors GOF Test</b>						
406	5% Lilliefors Critical Value				0.14		Data Not Normal at 5% Significance Level						
407	<b>Data Not Normal at 5% Significance Level</b>												
408													
409	<b>Assuming Normal Distribution</b>												
410	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
411	95% Student's-t UCL				4.879		95% Adjusted-CLT UCL (Chen-1995)				5.271		
412									95% Modified-t UCL (Johnson-1978)				4.946
413													
414	<b>Gamma GOF Test</b>												
415	A-D Test Statistic				2.727		<b>Anderson-Darling Gamma GOF Test</b>						
416	5% A-D Critical Value				0.784		Data Not Gamma Distributed at 5% Significance Level						
417	K-S Test Statistic				0.224		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
418	5% K-S Critical Value				0.146		Data Not Gamma Distributed at 5% Significance Level						
419	<b>Data Not Gamma Distributed at 5% Significance Level</b>												
420													
421	<b>Gamma Statistics</b>												
422	k hat (MLE)				0.857		k star (bias corrected MLE)				0.808		
423	Theta hat (MLE)				3.966		Theta star (bias corrected MLE)				4.206		
424	nu hat (MLE)				66.86		nu star (bias corrected)				63.05		

	A	B	C	D	E	F	G	H	I	J	K	L
425	MLE Mean (bias corrected)					3.399	MLE Sd (bias corrected)					3.781
426						Approximate Chi Square Value (0.05)					45.78	
427	Adjusted Level of Significance					0.0437	Adjusted Chi Square Value					45.2
428												
429	<b>Assuming Gamma Distribution</b>											
430	95% Approximate Gamma UCL (use when n>=50))					4.681	95% Adjusted Gamma UCL (use when n<50)					4.742
431												
432	<b>Lognormal GOF Test</b>											
433	Shapiro Wilk Test Statistic					0.942	<b>Shapiro Wilk Lognormal GOF Test</b>					
434	5% Shapiro Wilk Critical Value					0.939	Data appear Lognormal at 5% Significance Level					
435	Lilliefors Test Statistic					0.133	<b>Lilliefors Lognormal GOF Test</b>					
436	5% Lilliefors Critical Value					0.14	Data appear Lognormal at 5% Significance Level					
437	<b>Data appear Lognormal at 5% Significance Level</b>											
438												
439	<b>Lognormal Statistics</b>											
440	Minimum of Logged Data					-2.303	Mean of logged Data					0.537
441	Maximum of Logged Data					3.178	SD of logged Data					1.1
442												
443	<b>Assuming Lognormal Distribution</b>											
444	95% H-UCL					4.913	90% Chebyshev (MVUE) UCL					4.986
445	95% Chebyshev (MVUE) UCL					5.859	97.5% Chebyshev (MVUE) UCL					7.07
446	99% Chebyshev (MVUE) UCL					9.448						
447												
448	<b>Nonparametric Distribution Free UCL Statistics</b>											
449	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
450												
451	<b>Nonparametric Distribution Free UCLs</b>											
452	95% CLT UCL					4.843	95% Jackknife UCL					4.879
453	95% Standard Bootstrap UCL					4.812	95% Bootstrap-t UCL					5.747
454	95% Hall's Bootstrap UCL					4.972	95% Percentile Bootstrap UCL					5.013
455	95% BCA Bootstrap UCL					5.25						
456	90% Chebyshev(Mean, Sd) UCL					6.032	95% Chebyshev(Mean, Sd) UCL					7.225
457	97.5% Chebyshev(Mean, Sd) UCL					8.88	99% Chebyshev(Mean, Sd) UCL					12.13
458												
459	<b>Suggested UCL to Use</b>											
460	95% H-UCL					4.913						
461												
462	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
463	Recommendations are based upon data size, data distribution, and skewness.											
464	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
465	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
466												
467	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
468	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
469	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
470	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
471												
472												
473	<b>Chromium</b>											
474												
475	<b>General Statistics</b>											
476	Total Number of Observations					39	Number of Distinct Observations					38
477							Number of Missing Observations					0

	A	B	C	D	E	F	G	H	I	J	K	L
478					Minimum	1.84					Mean	85.05
479					Maximum	637					Median	38.7
480					SD	149.1					Std. Error of Mean	23.88
481					Coefficient of Variation	1.753					Skewness	3.069
482												
483	<b>Normal GOF Test</b>											
484					Shapiro Wilk Test Statistic	0.492					<b>Shapiro Wilk GOF Test</b>	
485					5% Shapiro Wilk Critical Value	0.939					Data Not Normal at 5% Significance Level	
486					Lilliefors Test Statistic	0.374					<b>Lilliefors GOF Test</b>	
487					5% Lilliefors Critical Value	0.14					Data Not Normal at 5% Significance Level	
488	<b>Data Not Normal at 5% Significance Level</b>											
489												
490	<b>Assuming Normal Distribution</b>											
491	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
492					95% Student's-t UCL	125.3					95% Adjusted-CLT UCL (Chen-1995)	136.9
493											95% Modified-t UCL (Johnson-1978)	127.3
494												
495	<b>Gamma GOF Test</b>											
496					A-D Test Statistic	2.915					<b>Anderson-Darling Gamma GOF Test</b>	
497					5% A-D Critical Value	0.787					Data Not Gamma Distributed at 5% Significance Level	
498					K-S Test Statistic	0.26					<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
499					5% K-S Critical Value	0.147					Data Not Gamma Distributed at 5% Significance Level	
500	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
501												
502	<b>Gamma Statistics</b>											
503					k hat (MLE)	0.798					k star (bias corrected MLE)	0.753
504					Theta hat (MLE)	106.6					Theta star (bias corrected MLE)	112.9
505					nu hat (MLE)	62.23					nu star (bias corrected)	58.77
506					MLE Mean (bias corrected)	85.05					MLE Sd (bias corrected)	97.99
507											Approximate Chi Square Value (0.05)	42.15
508					Adjusted Level of Significance	0.0437					Adjusted Chi Square Value	41.59
509												
510	<b>Assuming Gamma Distribution</b>											
511					95% Approximate Gamma UCL (use when n>=50))	118.6					95% Adjusted Gamma UCL (use when n<50)	120.2
512												
513	<b>Lognormal GOF Test</b>											
514					Shapiro Wilk Test Statistic	0.937					<b>Shapiro Wilk Lognormal GOF Test</b>	
515					5% Shapiro Wilk Critical Value	0.939					Data Not Lognormal at 5% Significance Level	
516					Lilliefors Test Statistic	0.158					<b>Lilliefors Lognormal GOF Test</b>	
517					5% Lilliefors Critical Value	0.14					Data Not Lognormal at 5% Significance Level	
518	<b>Data Not Lognormal at 5% Significance Level</b>											
519												
520	<b>Lognormal Statistics</b>											
521					Minimum of Logged Data	0.61					Mean of logged Data	3.699
522					Maximum of Logged Data	6.457					SD of logged Data	1.132
523												
524	<b>Assuming Lognormal Distribution</b>											
525					95% H-UCL	122.6					90% Chebyshev (MVUE) UCL	123.4
526					95% Chebyshev (MVUE) UCL	145.5					97.5% Chebyshev (MVUE) UCL	176.2
527					99% Chebyshev (MVUE) UCL	236.4						
528												
529	<b>Nonparametric Distribution Free UCL Statistics</b>											
530	<b>Data do not follow a Discernible Distribution (0.05)</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
531												
532	<b>Nonparametric Distribution Free UCLs</b>											
533	95% CLT UCL					124.3	95% Jackknife UCL					125.3
534	95% Standard Bootstrap UCL					124.2	95% Bootstrap-t UCL					149.5
535	95% Hall's Bootstrap UCL					124.3	95% Percentile Bootstrap UCL					127.9
536	95% BCA Bootstrap UCL					141.2						
537	90% Chebyshev(Mean, Sd) UCL					156.7	95% Chebyshev(Mean, Sd) UCL					189.1
538	97.5% Chebyshev(Mean, Sd) UCL					234.2	99% Chebyshev(Mean, Sd) UCL					322.6
539												
540	<b>Suggested UCL to Use</b>											
541	95% Chebyshev (Mean, Sd) UCL					189.1						
542												
543	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
544	Recommendations are based upon data size, data distribution, and skewness.											
545	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
546	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
547												
548	<b>Cobalt</b>											
549												
550	<b>General Statistics</b>											
551	Total Number of Observations					37	Number of Distinct Observations					27
552	Number of Detects					36	Number of Non-Detects					1
553	Number of Distinct Detects					26	Number of Distinct Non-Detects					1
554	Minimum Detect					1.6	Minimum Non-Detect					2.5
555	Maximum Detect					7.9	Maximum Non-Detect					2.5
556	Variance Detects					2.419	Percent Non-Detects					2.703%
557	Mean Detects					4.433	SD Detects					1.555
558	Median Detects					4.25	CV Detects					0.351
559	Skewness Detects					0.182	Kurtosis Detects					-0.535
560	Mean of Logged Detects					1.422	SD of Logged Detects					0.387
561												
562	<b>Normal GOF Test on Detects Only</b>											
563	Shapiro Wilk Test Statistic					0.977	<b>Shapiro Wilk GOF Test</b>					
564	5% Shapiro Wilk Critical Value					0.935	Detected Data appear Normal at 5% Significance Level					
565	Lilliefors Test Statistic					0.0919	<b>Lilliefors GOF Test</b>					
566	5% Lilliefors Critical Value					0.145	Detected Data appear Normal at 5% Significance Level					
567	<b>Detected Data appear Normal at 5% Significance Level</b>											
568												
569	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
570	KM Mean					4.369	KM Standard Error of Mean					0.261
571	KM SD					1.562	95% KM (BCA) UCL					4.848
572	95% KM (t) UCL					4.809	95% KM (Percentile Bootstrap) UCL					4.776
573	95% KM (z) UCL					4.798	95% KM Bootstrap t UCL					4.832
574	90% KM Chebyshev UCL					5.151	95% KM Chebyshev UCL					5.505
575	97.5% KM Chebyshev UCL					5.996	99% KM Chebyshev UCL					6.961
576												
577	<b>Gamma GOF Tests on Detected Observations Only</b>											
578	A-D Test Statistic					0.301	<b>Anderson-Darling GOF Test</b>					
579	5% A-D Critical Value					0.749	Detected data appear Gamma Distributed at 5% Significance Level					
580	K-S Test Statistic					0.0858	<b>Kolmogorov-Smirnov GOF</b>					
581	5% K-S Critical Value					0.147	Detected data appear Gamma Distributed at 5% Significance Level					
582	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
583												

	A	B	C	D	E	F	G	H	I	J	K	L	
584	<b>Gamma Statistics on Detected Data Only</b>												
585	k hat (MLE)				7.61	k star (bias corrected MLE)				6.994			
586	Theta hat (MLE)				0.583	Theta star (bias corrected MLE)				0.634			
587	nu hat (MLE)				547.9	nu star (bias corrected)				503.6			
588	Mean (detects)				4.433								
589													
590	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
591	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
592	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
593	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
594	This is especially true when the sample size is small.												
595	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
596	Minimum				1.6	Mean				4.375			
597	Maximum				7.9	Median				4.2			
598	SD				1.574	CV				0.36			
599	k hat (MLE)				7.303	k star (bias corrected MLE)				6.729			
600	Theta hat (MLE)				0.599	Theta star (bias corrected MLE)				0.65			
601	nu hat (MLE)				540.4	nu star (bias corrected)				497.9			
602	Adjusted Level of Significance ( $\beta$ )				0.0431								
603	Approximate Chi Square Value (497.94, $\alpha$ )				447.2	Adjusted Chi Square Value (497.94, $\beta$ )				445.1			
604	95% Gamma Approximate UCL (use when $n \geq 50$ )				4.872	95% Gamma Adjusted UCL (use when $n < 50$ )				4.895			
605													
606	<b>Estimates of Gamma Parameters using KM Estimates</b>												
607	Mean (KM)				4.369	SD (KM)				1.562			
608	Variance (KM)				2.439	SE of Mean (KM)				0.261			
609	k hat (KM)				7.827	k star (KM)				7.21			
610	nu hat (KM)				579.2	nu star (KM)				533.6			
611	theta hat (KM)				0.558	theta star (KM)				0.606			
612	80% gamma percentile (KM)				5.647	90% gamma percentile (KM)				6.541			
613	95% gamma percentile (KM)				7.344	99% gamma percentile (KM)				9.013			
614													
615	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
616	Approximate Chi Square Value (533.56, $\alpha$ )				481	Adjusted Chi Square Value (533.56, $\beta$ )				478.8			
617	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				4.847	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				4.869			
618													
619	<b>Lognormal GOF Test on Detected Observations Only</b>												
620	Shapiro Wilk Test Statistic				0.957	<b>Shapiro Wilk GOF Test</b>							
621	5% Shapiro Wilk Critical Value				0.935	Detected Data appear Lognormal at 5% Significance Level							
622	Lilliefors Test Statistic				0.104	<b>Lilliefors GOF Test</b>							
623	5% Lilliefors Critical Value				0.145	Detected Data appear Lognormal at 5% Significance Level							
624	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
625													
626	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
627	Mean in Original Scale				4.375	Mean in Log Scale				1.406			
628	SD in Original Scale				1.574	SD in Log Scale				0.394			
629	95% t UCL (assumes normality of ROS data)				4.812	95% Percentile Bootstrap UCL				4.808			
630	95% BCA Bootstrap UCL				4.786	95% Bootstrap t UCL				4.82			
631	95% H-UCL (Log ROS)				4.973								
632													
633	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
634	KM Mean (logged)				1.403	KM Geo Mean				4.067			
635	KM SD (logged)				0.394	95% Critical H Value (KM-Log)				1.84			
636	KM Standard Error of Mean (logged)				0.0659	95% H-UCL (KM -Log)				4.96			

	A	B	C	D	E	F	G	H	I	J	K	L
637	KM SD (logged)				0.394	95% Critical H Value (KM-Log)					1.84	
638	KM Standard Error of Mean (logged)				0.0659							
639												
640	<b>DL/2 Statistics</b>											
641	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
642	Mean in Original Scale				4.347	Mean in Log Scale				1.39		
643	SD in Original Scale				1.621	SD in Log Scale				0.429		
644	95% t UCL (Assumes normality)				4.797	95% H-Stat UCL				5.028		
645	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
646												
647	<b>Nonparametric Distribution Free UCL Statistics</b>											
648	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>											
649												
650	<b>Suggested UCL to Use</b>											
651	95% KM (t) UCL				4.809							
652												
653	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
654	Recommendations are based upon data size, data distribution, and skewness.											
655	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
656	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
657												
658												
659	<b>Copper</b>											
660												
661	<b>General Statistics</b>											
662	Total Number of Observations				39	Number of Distinct Observations				38		
663						Number of Missing Observations				0		
664	Minimum				5.49	Mean				368.6		
665	Maximum				2740	Median				155		
666	SD				551.9	Std. Error of Mean				88.37		
667	Coefficient of Variation				1.497	Skewness				2.877		
668												
669	<b>Normal GOF Test</b>											
670	Shapiro Wilk Test Statistic				0.608	<b>Shapiro Wilk GOF Test</b>						
671	5% Shapiro Wilk Critical Value				0.939	Data Not Normal at 5% Significance Level						
672	Lilliefors Test Statistic				0.289	<b>Lilliefors GOF Test</b>						
673	5% Lilliefors Critical Value				0.14	Data Not Normal at 5% Significance Level						
674	<b>Data Not Normal at 5% Significance Level</b>											
675												
676	<b>Assuming Normal Distribution</b>											
677	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
678	95% Student's-t UCL				517.6	95% Adjusted-CLT UCL (Chen-1995)				557.5		
679						95% Modified-t UCL (Johnson-1978)				524.4		
680												
681	<b>Gamma GOF Test</b>											
682	A-D Test Statistic				1.53	<b>Anderson-Darling Gamma GOF Test</b>						
683	5% A-D Critical Value				0.786	Data Not Gamma Distributed at 5% Significance Level						
684	K-S Test Statistic				0.174	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
685	5% K-S Critical Value				0.146	Data Not Gamma Distributed at 5% Significance Level						
686	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
687												
688	<b>Gamma Statistics</b>											
689	k hat (MLE)				0.827	k star (bias corrected MLE)				0.781		



	A	B	C	D	E	F	G	H	I	J	K	L
690	Theta hat (MLE)				445.7	Theta star (bias corrected MLE)					472.2	
691	nu hat (MLE)				64.51	nu star (bias corrected)					60.88	
692	MLE Mean (bias corrected)				368.6	MLE Sd (bias corrected)					417.2	
693						Approximate Chi Square Value (0.05)					43.94	
694	Adjusted Level of Significance				0.0437	Adjusted Chi Square Value					43.37	
695												
696	<b>Assuming Gamma Distribution</b>											
697	95% Approximate Gamma UCL (use when n>=50))				510.8	95% Adjusted Gamma UCL (use when n<50)					517.5	
698												
699	<b>Lognormal GOF Test</b>											
700	Shapiro Wilk Test Statistic				0.975	<b>Shapiro Wilk Lognormal GOF Test</b>						
701	5% Shapiro Wilk Critical Value				0.939	Data appear Lognormal at 5% Significance Level						
702	Lilliefors Test Statistic				0.0932	<b>Lilliefors Lognormal GOF Test</b>						
703	5% Lilliefors Critical Value				0.14	Data appear Lognormal at 5% Significance Level						
704	<b>Data appear Lognormal at 5% Significance Level</b>											
705												
706	<b>Lognormal Statistics</b>											
707	Minimum of Logged Data				1.703	Mean of logged Data					5.195	
708	Maximum of Logged Data				7.916	SD of logged Data					1.214	
709												
710	<b>Assuming Lognormal Distribution</b>											
711	95% H-UCL				636.2	90% Chebyshev (MVUE) UCL					625.5	
712	95% Chebyshev (MVUE) UCL				743.4	97.5% Chebyshev (MVUE) UCL					907	
713	99% Chebyshev (MVUE) UCL				1228							
714												
715	<b>Nonparametric Distribution Free UCL Statistics</b>											
716	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
717												
718	<b>Nonparametric Distribution Free UCLs</b>											
719	95% CLT UCL				514	95% Jackknife UCL					517.6	
720	95% Standard Bootstrap UCL				513.4	95% Bootstrap-t UCL					622	
721	95% Hall's Bootstrap UCL				575.6	95% Percentile Bootstrap UCL					525.1	
722	95% BCA Bootstrap UCL				565.2							
723	90% Chebyshev(Mean, Sd) UCL				633.7	95% Chebyshev(Mean, Sd) UCL					753.8	
724	97.5% Chebyshev(Mean, Sd) UCL				920.5	99% Chebyshev(Mean, Sd) UCL					1248	
725												
726	<b>Suggested UCL to Use</b>											
727	95% H-UCL				636.2							
728												
729	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
730	Recommendations are based upon data size, data distribution, and skewness.											
731	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
732	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
733												
734	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
735	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
736	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
737	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
738												
739												
740	<b>Lead</b>											
741												
742	<b>General Statistics</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
743	Total Number of Observations					39	Number of Distinct Observations					38
744							Number of Missing Observations					0
745	Minimum					43.1	Mean					639.5
746	Maximum					9780	Median					268
747	SD					1546	Std. Error of Mean					247.5
748	Coefficient of Variation					2.417	Skewness					5.726
749												
750	<b>Normal GOF Test</b>											
751	Shapiro Wilk Test Statistic					0.336	<b>Shapiro Wilk GOF Test</b>					
752	5% Shapiro Wilk Critical Value					0.939	Data Not Normal at 5% Significance Level					
753	Lilliefors Test Statistic					0.35	<b>Lilliefors GOF Test</b>					
754	5% Lilliefors Critical Value					0.14	Data Not Normal at 5% Significance Level					
755	<b>Data Not Normal at 5% Significance Level</b>											
756												
757	<b>Assuming Normal Distribution</b>											
758	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
759	95% Student's-t UCL					1057	95% Adjusted-CLT UCL (Chen-1995)					1289
760							95% Modified-t UCL (Johnson-1978)					1095
761												
762	<b>Gamma GOF Test</b>											
763	A-D Test Statistic					2.204	<b>Anderson-Darling Gamma GOF Test</b>					
764	5% A-D Critical Value					0.788	Data Not Gamma Distributed at 5% Significance Level					
765	K-S Test Statistic					0.168	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
766	5% K-S Critical Value					0.147	Data Not Gamma Distributed at 5% Significance Level					
767	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
768												
769	<b>Gamma Statistics</b>											
770	k hat (MLE)					0.779	k star (bias corrected MLE)					0.736
771	Theta hat (MLE)					820.8	Theta star (bias corrected MLE)					868.6
772	nu hat (MLE)					60.77	nu star (bias corrected)					57.43
773	MLE Mean (bias corrected)					639.5	MLE Sd (bias corrected)					745.3
774							Approximate Chi Square Value (0.05)					41.01
775	Adjusted Level of Significance					0.0437	Adjusted Chi Square Value					40.46
776												
777	<b>Assuming Gamma Distribution</b>											
778	95% Approximate Gamma UCL (use when n>=50))					895.5	95% Adjusted Gamma UCL (use when n<50)					907.6
779												
780	<b>Lognormal GOF Test</b>											
781	Shapiro Wilk Test Statistic					0.959	<b>Shapiro Wilk Lognormal GOF Test</b>					
782	5% Shapiro Wilk Critical Value					0.939	Data appear Lognormal at 5% Significance Level					
783	Lilliefors Test Statistic					0.0754	<b>Lilliefors Lognormal GOF Test</b>					
784	5% Lilliefors Critical Value					0.14	Data appear Lognormal at 5% Significance Level					
785	<b>Data appear Lognormal at 5% Significance Level</b>											
786												
787	<b>Lognormal Statistics</b>											
788	Minimum of Logged Data					3.764	Mean of logged Data					5.696
789	Maximum of Logged Data					9.188	SD of logged Data					1.061
790												
791	<b>Assuming Lognormal Distribution</b>											
792	95% H-UCL					799.9	90% Chebyshev (MVUE) UCL					819.1
793	95% Chebyshev (MVUE) UCL					958.5	97.5% Chebyshev (MVUE) UCL					1152
794	99% Chebyshev (MVUE) UCL					1532						
795												

	A	B	C	D	E	F	G	H	I	J	K	L
796	<b>Nonparametric Distribution Free UCL Statistics</b>											
797	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
798												
799	<b>Nonparametric Distribution Free UCLs</b>											
800	95% CLT UCL				1047		95% Jackknife UCL				1057	
801	95% Standard Bootstrap UCL				1042		95% Bootstrap-t UCL				2186	
802	95% Hall's Bootstrap UCL				2494		95% Percentile Bootstrap UCL				1117	
803	95% BCA Bootstrap UCL				1406							
804	90% Chebyshev(Mean, Sd) UCL				1382		95% Chebyshev(Mean, Sd) UCL				1718	
805	97.5% Chebyshev(Mean, Sd) UCL				2185		99% Chebyshev(Mean, Sd) UCL				3102	
806												
807	<b>Suggested UCL to Use</b>											
808	95% H-UCL				799.9							
809												
810	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
811	Recommendations are based upon data size, data distribution, and skewness.											
812	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
813	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
814												
815	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											
816	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>											
817	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>											
818	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>											
819												
820												
821	<b>Manganese</b>											
822												
823	<b>General Statistics</b>											
824	Total Number of Observations				39		Number of Distinct Observations				38	
825							Number of Missing Observations				0	
826	Minimum				5.4		Mean				946.2	
827	Maximum				3350		Median				728	
828	SD				834.6		Std. Error of Mean				133.7	
829	Coefficient of Variation				0.882		Skewness				1.423	
830												
831	<b>Normal GOF Test</b>											
832	Shapiro Wilk Test Statistic				0.848		<b>Shapiro Wilk GOF Test</b>					
833	5% Shapiro Wilk Critical Value				0.939		Data Not Normal at 5% Significance Level					
834	Lilliefors Test Statistic				0.183		<b>Lilliefors GOF Test</b>					
835	5% Lilliefors Critical Value				0.14		Data Not Normal at 5% Significance Level					
836	<b>Data Not Normal at 5% Significance Level</b>											
837												
838	<b>Assuming Normal Distribution</b>											
839	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
840	95% Student's-t UCL				1171		95% Adjusted-CLT UCL (Chen-1995)				1199	
841							95% Modified-t UCL (Johnson-1978)				1177	
842												
843	<b>Gamma GOF Test</b>											
844	A-D Test Statistic				0.215		<b>Anderson-Darling Gamma GOF Test</b>					
845	5% A-D Critical Value				0.773		Detected data appear Gamma Distributed at 5% Significance Level					
846	K-S Test Statistic				0.0695		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
847	5% K-S Critical Value				0.145		Detected data appear Gamma Distributed at 5% Significance Level					
848	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											

	A	B	C	D	E	F	G	H	I	J	K	L	
849													
850	<b>Gamma Statistics</b>												
851	k hat (MLE)				1.227	k star (bias corrected MLE)				1.15			
852	Theta hat (MLE)				770.9	Theta star (bias corrected MLE)				822.7			
853	nu hat (MLE)				95.73	nu star (bias corrected)				89.7			
854	MLE Mean (bias corrected)				946.2	MLE Sd (bias corrected)				882.3			
855					Approximate Chi Square Value (0.05)				68.87				
856	Adjusted Level of Significance				0.0437	Adjusted Chi Square Value				68.15			
857													
858	<b>Assuming Gamma Distribution</b>												
859	95% Approximate Gamma UCL (use when n>=50)				1232	95% Adjusted Gamma UCL (use when n<50)				1245			
860													
861	<b>Lognormal GOF Test</b>												
862	Shapiro Wilk Test Statistic				0.892	<b>Shapiro Wilk Lognormal GOF Test</b>							
863	5% Shapiro Wilk Critical Value				0.939	Data Not Lognormal at 5% Significance Level							
864	Lilliefors Test Statistic				0.098	<b>Lilliefors Lognormal GOF Test</b>							
865	5% Lilliefors Critical Value				0.14	Data appear Lognormal at 5% Significance Level							
866	<b>Data appear Approximate Lognormal at 5% Significance Level</b>												
867													
868	<b>Lognormal Statistics</b>												
869	Minimum of Logged Data				1.686	Mean of logged Data				6.393			
870	Maximum of Logged Data				8.117	SD of logged Data				1.181			
871													
872	<b>Assuming Lognormal Distribution</b>												
873	95% H-UCL				1983	90% Chebyshev (MVUE) UCL				1969			
874	95% Chebyshev (MVUE) UCL				2333	97.5% Chebyshev (MVUE) UCL				2838			
875	99% Chebyshev (MVUE) UCL				3830								
876													
877	<b>Nonparametric Distribution Free UCL Statistics</b>												
878	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
879													
880	<b>Nonparametric Distribution Free UCLs</b>												
881	95% CLT UCL				1166	95% Jackknife UCL				1171			
882	95% Standard Bootstrap UCL				1168	95% Bootstrap-t UCL				1234			
883	95% Hall's Bootstrap UCL				1212	95% Percentile Bootstrap UCL				1177			
884	95% BCA Bootstrap UCL				1213								
885	90% Chebyshev(Mean, Sd) UCL				1347	95% Chebyshev(Mean, Sd) UCL				1529			
886	97.5% Chebyshev(Mean, Sd) UCL				1781	99% Chebyshev(Mean, Sd) UCL				2276			
887													
888	<b>Suggested UCL to Use</b>												
889	95% Adjusted Gamma UCL				1245								
890													
891	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
892	Recommendations are based upon data size, data distribution, and skewness.												
893	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
894	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
895													
896													
897	<b>Mercury</b>												
898													
899	<b>General Statistics</b>												
900	Total Number of Observations				39	Number of Distinct Observations				37			
901						Number of Missing Observations				0			

	A	B	C	D	E	F	G	H	I	J	K	L	
902					Minimum	0.046					Mean	0.293	
903					Maximum	1.01					Median	0.195	
904					SD	0.237					Std. Error of Mean	0.0379	
905					Coefficient of Variation	0.808					Skewness	1.549	
906													
907	<b>Normal GOF Test</b>												
908					Shapiro Wilk Test Statistic	0.802					<b>Shapiro Wilk GOF Test</b>		
909					5% Shapiro Wilk Critical Value	0.939					Data Not Normal at 5% Significance Level		
910					Lilliefors Test Statistic	0.214					<b>Lilliefors GOF Test</b>		
911					5% Lilliefors Critical Value	0.14					Data Not Normal at 5% Significance Level		
912	<b>Data Not Normal at 5% Significance Level</b>												
913													
914	<b>Assuming Normal Distribution</b>												
915					<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>		
916					95% Student's-t UCL	0.357					95% Adjusted-CLT UCL (Chen-1995)	0.365	
917											95% Modified-t UCL (Johnson-1978)	0.358	
918													
919	<b>Gamma GOF Test</b>												
920					A-D Test Statistic	0.947					<b>Anderson-Darling Gamma GOF Test</b>		
921					5% A-D Critical Value	0.759					Data Not Gamma Distributed at 5% Significance Level		
922					K-S Test Statistic	0.13					<b>Kolmogorov-Smirnov Gamma GOF Test</b>		
923					5% K-S Critical Value	0.143					Detected data appear Gamma Distributed at 5% Significance Level		
924	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>												
925													
926	<b>Gamma Statistics</b>												
927					k hat (MLE)	2.012					k star (bias corrected MLE)	1.874	
928					Theta hat (MLE)	0.146					Theta star (bias corrected MLE)	0.156	
929					nu hat (MLE)	156.9					nu star (bias corrected)	146.2	
930					MLE Mean (bias corrected)	0.293					MLE Sd (bias corrected)	0.214	
931											Approximate Chi Square Value (0.05)	119.3	
932					Adjusted Level of Significance	0.0437					Adjusted Chi Square Value	118.3	
933													
934	<b>Assuming Gamma Distribution</b>												
935					95% Approximate Gamma UCL (use when n>=50)	0.359					95% Adjusted Gamma UCL (use when n<50)	0.362	
936													
937	<b>Lognormal GOF Test</b>												
938					Shapiro Wilk Test Statistic	0.971					<b>Shapiro Wilk Lognormal GOF Test</b>		
939					5% Shapiro Wilk Critical Value	0.939					Data appear Lognormal at 5% Significance Level		
940					Lilliefors Test Statistic	0.0904					<b>Lilliefors Lognormal GOF Test</b>		
941					5% Lilliefors Critical Value	0.14					Data appear Lognormal at 5% Significance Level		
942	<b>Data appear Lognormal at 5% Significance Level</b>												
943													
944	<b>Lognormal Statistics</b>												
945					Minimum of Logged Data	-3.079					Mean of logged Data	-1.496	
946					Maximum of Logged Data	0.00995					SD of logged Data	0.731	
947													
948	<b>Assuming Lognormal Distribution</b>												
949					95% H-UCL	0.376					90% Chebyshev (MVUE) UCL	0.402	
950					95% Chebyshev (MVUE) UCL	0.452					97.5% Chebyshev (MVUE) UCL	0.522	
951					99% Chebyshev (MVUE) UCL	0.66							
952													
953	<b>Nonparametric Distribution Free UCL Statistics</b>												
954	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												

	A	B	C	D	E	F	G	H	I	J	K	L	
955													
956	<b>Nonparametric Distribution Free UCLs</b>												
957	95% CLT UCL				0.355					95% Jackknife UCL		0.357	
958	95% Standard Bootstrap UCL				0.354					95% Bootstrap-t UCL		0.37	
959	95% Hall's Bootstrap UCL				0.366					95% Percentile Bootstrap UCL		0.359	
960	95% BCA Bootstrap UCL				0.37								
961	90% Chebyshev(Mean, Sd) UCL				0.407					95% Chebyshev(Mean, Sd) UCL		0.458	
962	97.5% Chebyshev(Mean, Sd) UCL				0.53					99% Chebyshev(Mean, Sd) UCL		0.67	
963													
964	<b>Suggested UCL to Use</b>												
965	95% Adjusted Gamma UCL				0.362								
966													
967	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test												
968	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL												
969													
970	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
971	Recommendations are based upon data size, data distribution, and skewness.												
972	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
973	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
974													
975	<b>Silver</b>												
976													
977	<b>General Statistics</b>												
978	Total Number of Observations				36					Number of Distinct Observations		22	
979	Number of Detects				35					Number of Non-Detects		1	
980	Number of Distinct Detects				22					Number of Distinct Non-Detects		1	
981	Minimum Detect				0.1					Minimum Non-Detect		0.5	
982	Maximum Detect				50.2					Maximum Non-Detect		0.5	
983	Variance Detects				86.24					Percent Non-Detects		2.778%	
984	Mean Detects				3.749					SD Detects		9.286	
985	Median Detects				0.7					CV Detects		2.477	
986	Skewness Detects				4.168					Kurtosis Detects		19.26	
987	Mean of Logged Detects				0.00139					SD of Logged Detects		1.445	
988													
989	<b>Normal GOF Test on Detects Only</b>												
990	Shapiro Wilk Test Statistic				0.425					<b>Shapiro Wilk GOF Test</b>			
991	5% Shapiro Wilk Critical Value				0.934					Detected Data Not Normal at 5% Significance Level			
992	Lilliefors Test Statistic				0.394					<b>Lilliefors GOF Test</b>			
993	5% Lilliefors Critical Value				0.148					Detected Data Not Normal at 5% Significance Level			
994	<b>Detected Data Not Normal at 5% Significance Level</b>												
995													
996	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
997	KM Mean		3.652					KM Standard Error of Mean		1.529			
998	KM SD		9.043					95% KM (BCA) UCL		6.741			
999	95% KM (t) UCL		6.236					95% KM (Percentile Bootstrap) UCL		6.314			
1000	95% KM (z) UCL		6.167					95% KM Bootstrap t UCL		10.14			
1001	90% KM Chebyshev UCL		8.24					95% KM Chebyshev UCL		10.32			
1002	97.5% KM Chebyshev UCL		13.2					99% KM Chebyshev UCL		18.87			
1003													
1004	<b>Gamma GOF Tests on Detected Observations Only</b>												
1005	A-D Test Statistic		3.18					<b>Anderson-Darling GOF Test</b>					
1006	5% A-D Critical Value		0.816					Detected Data Not Gamma Distributed at 5% Significance Level					
1007	K-S Test Statistic		0.249					<b>Kolmogorov-Smirnov GOF</b>					

	A	B	C	D	E	F	G	H	I	J	K	L	
1008	5% K-S Critical Value				0.157	Detected Data Not Gamma Distributed at 5% Significance Level							
1009	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>												
1010													
1011	<b>Gamma Statistics on Detected Data Only</b>												
1012	k hat (MLE)				0.484	k star (bias corrected MLE)				0.461			
1013	Theta hat (MLE)				7.75	Theta star (bias corrected MLE)				8.126			
1014	nu hat (MLE)				33.86	nu star (bias corrected)				32.29			
1015	Mean (detects)				3.749								
1016													
1017	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
1018	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1019	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1020	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1021	This is especially true when the sample size is small.												
1022	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1023	Minimum				0.01	Mean				3.645			
1024	Maximum				50.2	Median				0.65			
1025	SD				9.174	CV				2.517			
1026	k hat (MLE)				0.454	k star (bias corrected MLE)				0.435			
1027	Theta hat (MLE)				8.025	Theta star (bias corrected MLE)				8.382			
1028	nu hat (MLE)				32.7	nu star (bias corrected)				31.31			
1029	Adjusted Level of Significance ( $\beta$ )				0.0428								
1030	Approximate Chi Square Value (31.31, $\alpha$ )				19.52	Adjusted Chi Square Value (31.31, $\beta$ )				19.1			
1031	95% Gamma Approximate UCL (use when $n \geq 50$ )				5.845	95% Gamma Adjusted UCL (use when $n < 50$ )				5.974			
1032													
1033	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1034	Mean (KM)				3.652	SD (KM)				9.043			
1035	Variance (KM)				81.77	SE of Mean (KM)				1.529			
1036	k hat (KM)				0.163	k star (KM)				0.168			
1037	nu hat (KM)				11.74	nu star (KM)				12.1			
1038	theta hat (KM)				22.39	theta star (KM)				21.73			
1039	80% gamma percentile (KM)				4.332	90% gamma percentile (KM)				10.97			
1040	95% gamma percentile (KM)				19.63	99% gamma percentile (KM)				44.22			
1041													
1042	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1043	Approximate Chi Square Value (12.10, $\alpha$ )				5.293	Adjusted Chi Square Value (12.10, $\beta$ )				5.088			
1044	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				8.349	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				8.684			
1045													
1046	<b>Lognormal GOF Test on Detected Observations Only</b>												
1047	Shapiro Wilk Test Statistic				0.933	<b>Shapiro Wilk GOF Test</b>							
1048	5% Shapiro Wilk Critical Value				0.934	Detected Data Not Lognormal at 5% Significance Level							
1049	Lilliefors Test Statistic				0.124	<b>Lilliefors GOF Test</b>							
1050	5% Lilliefors Critical Value				0.148	Detected Data appear Lognormal at 5% Significance Level							
1051	<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>												
1052													
1053	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1054	Mean in Original Scale				3.651	Mean in Log Scale				-0.0397			
1055	SD in Original Scale				9.172	SD in Log Scale				1.445			
1056	95% t UCL (assumes normality of ROS data)				6.233	95% Percentile Bootstrap UCL				6.525			
1057	95% BCA Bootstrap UCL				7.879	95% Bootstrap t UCL				10.78			
1058	95% H-UCL (Log ROS)				5.595								
1059													
1060	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												

	A	B	C	D	E	F	G	H	I	J	K	L
1061				KM Mean (logged)		-0.0368					KM Geo Mean	0.964
1062				KM SD (logged)		1.425					95% Critical H Value (KM-Log)	2.907
1063				KM Standard Error of Mean (logged)		0.241					95% H-UCL (KM -Log)	5.357
1064				KM SD (logged)		1.425					95% Critical H Value (KM-Log)	2.907
1065				KM Standard Error of Mean (logged)		0.241						
1066												
1067	<b>DL/2 Statistics</b>											
1068	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1069				Mean in Original Scale		3.651					Mean in Log Scale	-0.0372
1070				SD in Original Scale		9.171					SD in Log Scale	1.443
1071				95% t UCL (Assumes normality)		6.234					95% H-Stat UCL	5.577
1072	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1073												
1074	<b>Nonparametric Distribution Free UCL Statistics</b>											
1075	<b>Detected Data appear Approximate Lognormal Distributed at 5% Significance Level</b>											
1076												
1077	<b>Suggested UCL to Use</b>											
1078				KM H-UCL		5.357						
1079												
1080	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1081	Recommendations are based upon data size, data distribution, and skewness.											
1082	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1083	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1084												
1085	<b>Thallium</b>											
1086												
1087	<b>General Statistics</b>											
1088				Total Number of Observations		13					Number of Distinct Observations	12
1089				Number of Detects		9					Number of Non-Detects	4
1090				Number of Distinct Detects		8					Number of Distinct Non-Detects	4
1091				Minimum Detect		0.7					Minimum Non-Detect	1
1092				Maximum Detect		4.1					Maximum Non-Detect	11
1093				Variance Detects		1.364					Percent Non-Detects	30.77%
1094				Mean Detects		1.978					SD Detects	1.168
1095				Median Detects		2.2					CV Detects	0.591
1096				Skewness Detects		0.523					Kurtosis Detects	-0.513
1097				Mean of Logged Detects		0.505					SD of Logged Detects	0.654
1098												
1099	<b>Normal GOF Test on Detects Only</b>											
1100				Shapiro Wilk Test Statistic		0.912					<b>Shapiro Wilk GOF Test</b>	
1101				5% Shapiro Wilk Critical Value		0.829					Detected Data appear Normal at 5% Significance Level	
1102				Lilliefors Test Statistic		0.177					<b>Lilliefors GOF Test</b>	
1103				5% Lilliefors Critical Value		0.274					Detected Data appear Normal at 5% Significance Level	
1104	<b>Detected Data appear Normal at 5% Significance Level</b>											
1105												
1106	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1107				KM Mean		1.675					KM Standard Error of Mean	0.333
1108				KM SD		1.089					95% KM (BCA) UCL	2.259
1109				95% KM (t) UCL		2.269					95% KM (Percentile Bootstrap) UCL	2.217
1110				95% KM (z) UCL		2.224					95% KM Bootstrap t UCL	2.397
1111				90% KM Chebyshev UCL		2.675					95% KM Chebyshev UCL	3.129
1112				97.5% KM Chebyshev UCL		3.758					99% KM Chebyshev UCL	4.993
1113												



	A	B	C	D	E	F	G	H	I	J	K	L	
1114	<b>Gamma GOF Tests on Detected Observations Only</b>												
1115	A-D Test Statistic				0.442	<b>Anderson-Darling GOF Test</b>							
1116	5% A-D Critical Value				0.727	Detected data appear Gamma Distributed at 5% Significance Level							
1117	K-S Test Statistic				0.209	<b>Kolmogorov-Smirnov GOF</b>							
1118	5% K-S Critical Value				0.281	Detected data appear Gamma Distributed at 5% Significance Level							
1119	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
1120													
1121	<b>Gamma Statistics on Detected Data Only</b>												
1122	k hat (MLE)				2.989	k star (bias corrected MLE)				2.067			
1123	Theta hat (MLE)				0.662	Theta star (bias corrected MLE)				0.957			
1124	nu hat (MLE)				53.8	nu star (bias corrected)				37.2			
1125	Mean (detects)				1.978								
1126													
1127	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
1128	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1129	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1130	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1131	This is especially true when the sample size is small.												
1132	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1133	Minimum				0.7	Mean				1.656			
1134	Maximum				4.1	Median				1.3			
1135	SD				1.093	CV				0.66			
1136	k hat (MLE)				2.778	k star (bias corrected MLE)				2.189			
1137	Theta hat (MLE)				0.596	Theta star (bias corrected MLE)				0.757			
1138	nu hat (MLE)				72.24	nu star (bias corrected)				56.9			
1139	Adjusted Level of Significance ( $\beta$ )				0.0301								
1140	Approximate Chi Square Value (56.90, $\alpha$ )				40.56	Adjusted Chi Square Value (56.90, $\beta$ )				38.6			
1141	95% Gamma Approximate UCL (use when $n \geq 50$ )				2.324	95% Gamma Adjusted UCL (use when $n < 50$ )				2.441			
1142													
1143	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1144	Mean (KM)				1.675	SD (KM)				1.089			
1145	Variance (KM)				1.185	SE of Mean (KM)				0.333			
1146	k hat (KM)				2.367	k star (KM)				1.872			
1147	nu hat (KM)				61.55	nu star (KM)				48.68			
1148	theta hat (KM)				0.708	theta star (KM)				0.895			
1149	80% gamma percentile (KM)				2.527	90% gamma percentile (KM)				3.309			
1150	95% gamma percentile (KM)				4.057	99% gamma percentile (KM)				5.724			
1151													
1152	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1153	Approximate Chi Square Value (48.68, $\alpha$ )				33.66	Adjusted Chi Square Value (48.68, $\beta$ )				31.89			
1154	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				2.422	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				2.557			
1155													
1156	<b>Lognormal GOF Test on Detected Observations Only</b>												
1157	Shapiro Wilk Test Statistic				0.898	<b>Shapiro Wilk GOF Test</b>							
1158	5% Shapiro Wilk Critical Value				0.829	Detected Data appear Lognormal at 5% Significance Level							
1159	Lilliefors Test Statistic				0.223	<b>Lilliefors GOF Test</b>							
1160	5% Lilliefors Critical Value				0.274	Detected Data appear Lognormal at 5% Significance Level							
1161	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
1162													
1163	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1164	Mean in Original Scale				1.665	Mean in Log Scale				0.33			
1165	SD in Original Scale				1.08	SD in Log Scale				0.613			
1166	95% t UCL (assumes normality of ROS data)				2.199	95% Percentile Bootstrap UCL				2.157			

	A	B	C	D	E	F	G	H	I	J	K	L
1167	95% BCA Bootstrap UCL				2.2	95% Bootstrap t UCL				2.427		
1168	95% H-UCL (Log ROS)				2.501							
1169												
1170	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1171	KM Mean (logged)				0.312	KM Geo Mean				1.366		
1172	KM SD (logged)				0.631	95% Critical H Value (KM-Log)				2.276		
1173	KM Standard Error of Mean (logged)				0.194	95% H-UCL (KM -Log)				2.524		
1174	KM SD (logged)				0.631	95% Critical H Value (KM-Log)				2.276		
1175	KM Standard Error of Mean (logged)				0.194							
1176												
1177	<b>DL/2 Statistics</b>											
1178	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
1179	Mean in Original Scale				1.919	Mean in Log Scale				0.342		
1180	SD in Original Scale				1.565	SD in Log Scale				0.827		
1181	95% t UCL (Assumes normality)				2.693	95% H-Stat UCL				3.653		
1182	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1183												
1184	<b>Nonparametric Distribution Free UCL Statistics</b>											
1185	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>											
1186												
1187	<b>Suggested UCL to Use</b>											
1188	95% KM (t) UCL				2.269							
1189												
1190	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1191	Recommendations are based upon data size, data distribution, and skewness.											
1192	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1193	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1194												
1195	<b>Vanadium</b>											
1196												
1197	<b>General Statistics</b>											
1198	Total Number of Observations				39	Number of Distinct Observations				37		
1199	Number of Detects				38	Number of Non-Detects				1		
1200	Number of Distinct Detects				36	Number of Distinct Non-Detects				1		
1201	Minimum Detect				7.3	Minimum Non-Detect				2.5		
1202	Maximum Detect				40.2	Maximum Non-Detect				2.5		
1203	Variance Detects				41.35	Percent Non-Detects				2.564%		
1204	Mean Detects				19.21	SD Detects				6.43		
1205	Median Detects				17.8	CV Detects				0.335		
1206	Skewness Detects				0.931	Kurtosis Detects				1.669		
1207	Mean of Logged Detects				2.902	SD of Logged Detects				0.334		
1208												
1209	<b>Normal GOF Test on Detects Only</b>											
1210	Shapiro Wilk Test Statistic				0.952	<b>Shapiro Wilk GOF Test</b>						
1211	5% Shapiro Wilk Critical Value				0.938	Detected Data appear Normal at 5% Significance Level						
1212	Lilliefors Test Statistic				0.131	<b>Lilliefors GOF Test</b>						
1213	5% Lilliefors Critical Value				0.142	Detected Data appear Normal at 5% Significance Level						
1214	<b>Detected Data appear Normal at 5% Significance Level</b>											
1215												
1216	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1217	KM Mean				18.78	KM Standard Error of Mean				1.103		
1218	KM SD				6.797	95% KM (BCA) UCL				20.54		
1219	95% KM (t) UCL				20.64	95% KM (Percentile Bootstrap) UCL				20.57		

	A	B	C	D	E	F	G	H	I	J	K	L
1220	95% KM (z) UCL				20.6	95% KM Bootstrap t UCL				20.81		
1221	90% KM Chebyshev UCL				22.09	95% KM Chebyshev UCL				23.59		
1222	97.5% KM Chebyshev UCL				25.67	99% KM Chebyshev UCL				29.76		
1223												
1224	<b>Gamma GOF Tests on Detected Observations Only</b>											
1225	A-D Test Statistic				0.215	<b>Anderson-Darling GOF Test</b>						
1226	5% A-D Critical Value				0.748	Detected data appear Gamma Distributed at 5% Significance Level						
1227	K-S Test Statistic				0.0885	<b>Kolmogorov-Smirnov GOF</b>						
1228	5% K-S Critical Value				0.143	Detected data appear Gamma Distributed at 5% Significance Level						
1229	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1230												
1231	<b>Gamma Statistics on Detected Data Only</b>											
1232	k hat (MLE)				9.533	k star (bias corrected MLE)				8.798		
1233	Theta hat (MLE)				2.015	Theta star (bias corrected MLE)				2.183		
1234	nu hat (MLE)				724.5	nu star (bias corrected)				668.7		
1235	Mean (detects)				19.21							
1236												
1237	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1238	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1239	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1240	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1241	This is especially true when the sample size is small.											
1242	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1243	Minimum				6.382	Mean				18.88		
1244	Maximum				40.2	Median				17.7		
1245	SD				6.669	CV				0.353		
1246	k hat (MLE)				8.102	k star (bias corrected MLE)				7.496		
1247	Theta hat (MLE)				2.33	Theta star (bias corrected MLE)				2.519		
1248	nu hat (MLE)				632	nu star (bias corrected)				584.7		
1249	Adjusted Level of Significance ( $\beta$ )				0.0437							
1250	Approximate Chi Square Value (584.68, $\alpha$ )				529.6	Adjusted Chi Square Value (584.68, $\beta$ )				527.5		
1251	95% Gamma Approximate UCL (use when $n \geq 50$ )				20.85	95% Gamma Adjusted UCL (use when $n < 50$ )				20.93		
1252												
1253	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1254	Mean (KM)				18.78	SD (KM)				6.797		
1255	Variance (KM)				46.2	SE of Mean (KM)				1.103		
1256	k hat (KM)				7.635	k star (KM)				7.065		
1257	nu hat (KM)				595.5	nu star (KM)				551.1		
1258	theta hat (KM)				2.46	theta star (KM)				2.659		
1259	80% gamma percentile (KM)				24.33	90% gamma percentile (KM)				28.21		
1260	95% gamma percentile (KM)				31.71	99% gamma percentile (KM)				38.99		
1261												
1262	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1263	Approximate Chi Square Value (551.06, $\alpha$ )				497.6	Adjusted Chi Square Value (551.06, $\beta$ )				495.6		
1264	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				20.8	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				20.88		
1265												
1266	<b>Lognormal GOF Test on Detected Observations Only</b>											
1267	Shapiro Wilk Test Statistic				0.99	<b>Shapiro Wilk GOF Test</b>						
1268	5% Shapiro Wilk Critical Value				0.938	Detected Data appear Lognormal at 5% Significance Level						
1269	Lilliefors Test Statistic				0.0674	<b>Lilliefors GOF Test</b>						
1270	5% Lilliefors Critical Value				0.142	Detected Data appear Lognormal at 5% Significance Level						
1271	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1272												

	A	B	C	D	E	F	G	H	I	J	K	L
1273	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1274	Mean in Original Scale				18.92		Mean in Log Scale				2.88	
1275	SD in Original Scale				6.603		SD in Log Scale				0.357	
1276	95% t UCL (assumes normality of ROS data)				20.7		95% Percentile Bootstrap UCL				20.65	
1277	95% BCA Bootstrap UCL				20.71		95% Bootstrap t UCL				20.93	
1278	95% H-UCL (Log ROS)				21.1							
1279												
1280	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1281	KM Mean (logged)				2.851		KM Geo Mean				17.31	
1282	KM SD (logged)				0.452		95% Critical H Value (KM-Log)				1.883	
1283	KM Standard Error of Mean (logged)				0.0734		95% H-UCL (KM -Log)				22.01	
1284	KM SD (logged)				0.452		95% Critical H Value (KM-Log)				1.883	
1285	KM Standard Error of Mean (logged)				0.0734							
1286												
1287	<b>DL/2 Statistics</b>											
1288	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1289	Mean in Original Scale				18.75		Mean in Log Scale				2.833	
1290	SD in Original Scale				6.966		SD in Log Scale				0.541	
1291	95% t UCL (Assumes normality)				20.63		95% H-Stat UCL				23.36	
1292	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1293												
1294	<b>Nonparametric Distribution Free UCL Statistics</b>											
1295	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>											
1296												
1297	<b>Suggested UCL to Use</b>											
1298	95% KM (t) UCL				20.64							
1299												
1300	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1301	Recommendations are based upon data size, data distribution, and skewness.											
1302	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1303	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1304												
1305												
1306	<b>Zinc</b>											
1307												
1308	<b>General Statistics</b>											
1309	Total Number of Observations				39		Number of Distinct Observations				38	
1310							Number of Missing Observations				0	
1311	Minimum				12.2		Mean				614	
1312	Maximum				4730		Median				335	
1313	SD				899.1		Std. Error of Mean				144	
1314	Coefficient of Variation				1.464		Skewness				3.5	
1315												
1316	<b>Normal GOF Test</b>											
1317	Shapiro Wilk Test Statistic				0.534		<b>Shapiro Wilk GOF Test</b>					
1318	5% Shapiro Wilk Critical Value				0.939		Data Not Normal at 5% Significance Level					
1319	Lilliefors Test Statistic				0.306		<b>Lilliefors GOF Test</b>					
1320	5% Lilliefors Critical Value				0.14		Data Not Normal at 5% Significance Level					
1321	<b>Data Not Normal at 5% Significance Level</b>											
1322												
1323	<b>Assuming Normal Distribution</b>											
1324	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
1325	95% Student's-t UCL				856.8		95% Adjusted-CLT UCL (Chen-1995)				937.1	

	A	B	C	D	E	F	G	H	I	J	K	L	
1326									95% Modified-t UCL (Johnson-1978)			870.2	
1327													
1328	<b>Gamma GOF Test</b>												
1329				A-D Test Statistic		2.296		<b>Anderson-Darling Gamma GOF Test</b>					
1330				5% A-D Critical Value		0.776		Data Not Gamma Distributed at 5% Significance Level					
1331				K-S Test Statistic		0.181		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
1332				5% K-S Critical Value		0.145		Data Not Gamma Distributed at 5% Significance Level					
1333	<b>Data Not Gamma Distributed at 5% Significance Level</b>												
1334													
1335	<b>Gamma Statistics</b>												
1336				k hat (MLE)		1.096		k star (bias corrected MLE)				1.029	
1337				Theta hat (MLE)		560.4		Theta star (bias corrected MLE)				597	
1338				nu hat (MLE)		85.46		nu star (bias corrected)				80.22	
1339				MLE Mean (bias corrected)		614		MLE Sd (bias corrected)				605.5	
1340								Approximate Chi Square Value (0.05)				60.59	
1341				Adjusted Level of Significance		0.0437		Adjusted Chi Square Value				59.91	
1342													
1343	<b>Assuming Gamma Distribution</b>												
1344				95% Approximate Gamma UCL (use when n>=50))		813.1		95% Adjusted Gamma UCL (use when n<50)				822.2	
1345													
1346	<b>Lognormal GOF Test</b>												
1347				Shapiro Wilk Test Statistic		0.914		<b>Shapiro Wilk Lognormal GOF Test</b>					
1348				5% Shapiro Wilk Critical Value		0.939		Data Not Lognormal at 5% Significance Level					
1349				Lilliefors Test Statistic		0.142		<b>Lilliefors Lognormal GOF Test</b>					
1350				5% Lilliefors Critical Value		0.14		Data Not Lognormal at 5% Significance Level					
1351	<b>Data Not Lognormal at 5% Significance Level</b>												
1352													
1353	<b>Lognormal Statistics</b>												
1354				Minimum of Logged Data		2.501		Mean of logged Data				5.899	
1355				Maximum of Logged Data		8.462		SD of logged Data				0.992	
1356													
1357	<b>Assuming Lognormal Distribution</b>												
1358				95% H-UCL		876.6		90% Chebyshev (MVUE) UCL				910.1	
1359				95% Chebyshev (MVUE) UCL		1057		97.5% Chebyshev (MVUE) UCL				1261	
1360				99% Chebyshev (MVUE) UCL		1662							
1361													
1362	<b>Nonparametric Distribution Free UCL Statistics</b>												
1363	<b>Data do not follow a Discernible Distribution (0.05)</b>												
1364													
1365	<b>Nonparametric Distribution Free UCLs</b>												
1366				95% CLT UCL		850.8		95% Jackknife UCL				856.8	
1367				95% Standard Bootstrap UCL		853.2		95% Bootstrap-t UCL				1170	
1368				95% Hall's Bootstrap UCL		1609		95% Percentile Bootstrap UCL				863	
1369				95% BCA Bootstrap UCL		990.5							
1370				90% Chebyshev(Mean, Sd) UCL		1046		95% Chebyshev(Mean, Sd) UCL				1242	
1371				97.5% Chebyshev(Mean, Sd) UCL		1513		99% Chebyshev(Mean, Sd) UCL				2047	
1372													
1373	<b>Suggested UCL to Use</b>												
1374				95% Chebyshev (Mean, Sd) UCL		1242							
1375													
1376	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1377	Recommendations are based upon data size, data distribution, and skewness.												
1378	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												

	A	B	C	D	E	F	G	H	I	J	K	L
1379	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1380												
1381	<b>Aroclor 1254</b>											
1382												
1383	<b>General Statistics</b>											
1384	Total Number of Observations				7		Number of Distinct Observations				6	
1385	Number of Detects				3		Number of Non-Detects				4	
1386	Number of Distinct Detects				3		Number of Distinct Non-Detects				3	
1387	Minimum Detect				0.11		Minimum Non-Detect				0.037	
1388	Maximum Detect				0.44		Maximum Non-Detect				0.051	
1389	Variance Detects				0.0272		Percent Non-Detects				57.14%	
1390	Mean Detects				0.277		SD Detects				0.165	
1391	Median Detects				0.28		CV Detects				0.596	
1392	Skewness Detects				-0.0909		Kurtosis Detects				N/A	
1393	Mean of Logged Detects				-1.434		SD of Logged Detects				0.707	
1394												
1395	<b>Warning: Data set has only 3 Detected Values.</b>											
1396	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											
1397												
1398												
1399	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1400	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1401	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1402	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1403												
1404	<b>Normal GOF Test on Detects Only</b>											
1405	Shapiro Wilk Test Statistic				1		Shapiro Wilk GOF Test					
1406	5% Shapiro Wilk Critical Value				0.767		Detected Data appear Normal at 5% Significance Level					
1407	Lilliefors Test Statistic				0.177		Lilliefors GOF Test					
1408	5% Lilliefors Critical Value				0.425		Detected Data appear Normal at 5% Significance Level					
1409	<b>Detected Data appear Normal at 5% Significance Level</b>											
1410												
1411	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1412	KM Mean				0.14		KM Standard Error of Mean				0.0684	
1413	KM SD				0.148		95% KM (BCA) UCL				N/A	
1414	95% KM (t) UCL				0.273		95% KM (Percentile Bootstrap) UCL				N/A	
1415	95% KM (z) UCL				0.252		95% KM Bootstrap t UCL				N/A	
1416	90% KM Chebyshev UCL				0.345		95% KM Chebyshev UCL				0.438	
1417	97.5% KM Chebyshev UCL				0.567		99% KM Chebyshev UCL				0.821	
1418												
1419	<b>Gamma GOF Tests on Detected Observations Only</b>											
1420	<b>Not Enough Data to Perform GOF Test</b>											
1421												
1422	<b>Gamma Statistics on Detected Data Only</b>											
1423	k hat (MLE)				3.518		k star (bias corrected MLE)				N/A	
1424	Theta hat (MLE)				0.0786		Theta star (bias corrected MLE)				N/A	
1425	nu hat (MLE)				21.11		nu star (bias corrected)				N/A	
1426	Mean (detects)				0.277							
1427												
1428	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1429	<b>GROS may not be used when data set has &gt; 50% NDs with many tied observations at multiple DLs</b>											
1430	<b>GROS may not be used when kstar of detects is small such as &lt;1.0, especially when the sample size is small (e.g., &lt;15-20)</b>											
1431	<b>For such situations, GROS method may yield incorrect values of UCLs and BTVs</b>											

	A	B	C	D	E	F	G	H	I	J	K	L	
1432	This is especially true when the sample size is small.												
1433	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1434	Minimum				0.01	Mean				0.124			
1435	Maximum				0.44	Median				0.01			
1436	SD				0.171	CV				1.379			
1437	k hat (MLE)				0.541	k star (bias corrected MLE)				0.404			
1438	Theta hat (MLE)				0.23	Theta star (bias corrected MLE)				0.307			
1439	nu hat (MLE)				7.569	nu star (bias corrected)				5.659			
1440	Adjusted Level of Significance ( $\beta$ )				0.0158								
1441	Approximate Chi Square Value (5.66, $\alpha$ )				1.468	Adjusted Chi Square Value (5.66, $\beta$ )				0.919			
1442	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.479	95% Gamma Adjusted UCL (use when $n < 50$ )				N/A			
1443													
1444	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1445	Mean (KM)				0.14	SD (KM)				0.148			
1446	Variance (KM)				0.0218	SE of Mean (KM)				0.0684			
1447	k hat (KM)				0.893	k star (KM)				0.606			
1448	nu hat (KM)				12.51	nu star (KM)				8.481			
1449	theta hat (KM)				0.156	theta star (KM)				0.231			
1450	80% gamma percentile (KM)				0.23	90% gamma percentile (KM)				0.363			
1451	95% gamma percentile (KM)				0.501	99% gamma percentile (KM)				0.836			
1452													
1453	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1454	Approximate Chi Square Value (8.48, $\alpha$ )				3.017	Adjusted Chi Square Value (8.48, $\beta$ )				2.123			
1455	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				0.393	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				0.558			
1456													
1457	<b>Lognormal GOF Test on Detected Observations Only</b>												
1458	Shapiro Wilk Test Statistic				0.961	<b>Shapiro Wilk GOF Test</b>							
1459	5% Shapiro Wilk Critical Value				0.767	Detected Data appear Lognormal at 5% Significance Level							
1460	Lilliefors Test Statistic				0.257	<b>Lilliefors GOF Test</b>							
1461	5% Lilliefors Critical Value				0.425	Detected Data appear Lognormal at 5% Significance Level							
1462	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
1463													
1464	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1465	Mean in Original Scale				0.131	Mean in Log Scale				-2.832			
1466	SD in Original Scale				0.166	SD in Log Scale				1.4			
1467	95% t UCL (assumes normality of ROS data)				0.253	95% Percentile Bootstrap UCL				0.227			
1468	95% BCA Bootstrap UCL				0.252	95% Bootstrap t UCL				0.599			
1469	95% H-UCL (Log ROS)				2.545								
1470													
1471	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1472	KM Mean (logged)				-2.498	KM Geo Mean				0.0822			
1473	KM SD (logged)				0.996	95% Critical H Value (KM-Log)				3.688			
1474	KM Standard Error of Mean (logged)				0.461	95% H-UCL (KM -Log)				0.605			
1475	KM SD (logged)				0.996	95% Critical H Value (KM-Log)				3.688			
1476	KM Standard Error of Mean (logged)				0.461								
1477													
1478	<b>DL/2 Statistics</b>												
1479	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>						
1480	Mean in Original Scale				0.131	Mean in Log Scale				-2.793			
1481	SD in Original Scale				0.166	SD in Log Scale				1.338			
1482	95% t UCL (Assumes normality)				0.253	95% H-Stat UCL				1.946			
1483	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
1484													

	A	B	C	D	E	F	G	H	I	J	K	L
1485	<b>Nonparametric Distribution Free UCL Statistics</b>											
1486	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>											
1487												
1488	<b>Suggested UCL to Use</b>											
1489	95% KM (t) UCL				0.273							
1490												
1491	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1492	Recommendations are based upon data size, data distribution, and skewness.											
1493	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1494	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1495												
1496	<b>Aroclor 1260</b>											
1497												
1498	<b>General Statistics</b>											
1499	Total Number of Observations				21		Number of Distinct Observations				19	
1500	Number of Detects				17		Number of Non-Detects				4	
1501	Number of Distinct Detects				17		Number of Distinct Non-Detects				3	
1502	Minimum Detect				0.023		Minimum Non-Detect				0.037	
1503	Maximum Detect				0.42		Maximum Non-Detect				0.051	
1504	Variance Detects				0.00956		Percent Non-Detects				19.05%	
1505	Mean Detects				0.0879		SD Detects				0.0978	
1506	Median Detects				0.044		CV Detects				1.112	
1507	Skewness Detects				2.739		Kurtosis Detects				8.66	
1508	Mean of Logged Detects				-2.805		SD of Logged Detects				0.829	
1509												
1510	<b>Normal GOF Test on Detects Only</b>											
1511	Shapiro Wilk Test Statistic				0.662		<b>Shapiro Wilk GOF Test</b>					
1512	5% Shapiro Wilk Critical Value				0.892		Detected Data Not Normal at 5% Significance Level					
1513	Lilliefors Test Statistic				0.253		<b>Lilliefors GOF Test</b>					
1514	5% Lilliefors Critical Value				0.207		Detected Data Not Normal at 5% Significance Level					
1515	<b>Detected Data Not Normal at 5% Significance Level</b>											
1516												
1517	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1518	KM Mean				0.0771		KM Standard Error of Mean				0.0199	
1519	KM SD				0.0883		95% KM (BCA) UCL				0.114	
1520	95% KM (t) UCL				0.111		95% KM (Percentile Bootstrap) UCL				0.112	
1521	95% KM (z) UCL				0.11		95% KM Bootstrap t UCL				0.15	
1522	90% KM Chebyshev UCL				0.137		95% KM Chebyshev UCL				0.164	
1523	97.5% KM Chebyshev UCL				0.201		99% KM Chebyshev UCL				0.275	
1524												
1525	<b>Gamma GOF Tests on Detected Observations Only</b>											
1526	A-D Test Statistic				0.783		<b>Anderson-Darling GOF Test</b>					
1527	5% A-D Critical Value				0.756		Detected Data Not Gamma Distributed at 5% Significance Level					
1528	K-S Test Statistic				0.209		<b>Kolmogorov-Smirnov GOF</b>					
1529	5% K-S Critical Value				0.213		Detected data appear Gamma Distributed at 5% Significance Level					
1530	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1531												
1532	<b>Gamma Statistics on Detected Data Only</b>											
1533	k hat (MLE)				1.48		k star (bias corrected MLE)				1.258	
1534	Theta hat (MLE)				0.0594		Theta star (bias corrected MLE)				0.0699	
1535	nu hat (MLE)				50.33		nu star (bias corrected)				42.78	
1536	Mean (detects)				0.0879							
1537												



	A	B	C	D	E	F	G	H	I	J	K	L
1538	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1539	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1540	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1541	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1542	This is especially true when the sample size is small.											
1543	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1544		Minimum	0.01							Mean	0.0748	
1545		Maximum	0.42							Median	0.037	
1546		SD	0.0919							CV	1.229	
1547		k hat (MLE)	1.218							k star (bias corrected MLE)	1.076	
1548		Theta hat (MLE)	0.0614							Theta star (bias corrected MLE)	0.0695	
1549		nu hat (MLE)	51.15							nu star (bias corrected)	45.18	
1550		Adjusted Level of Significance ( $\beta$ )	0.0383									
1551		Approximate Chi Square Value (45.18, $\alpha$ )	30.76							Adjusted Chi Square Value (45.18, $\beta$ )	29.85	
1552		95% Gamma Approximate UCL (use when $n \geq 50$ )	0.11							95% Gamma Adjusted UCL (use when $n < 50$ )	0.113	
1553												
1554	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1555		Mean (KM)	0.0771							SD (KM)	0.0883	
1556		Variance (KM)	0.00779							SE of Mean (KM)	0.0199	
1557		k hat (KM)	0.763							k star (KM)	0.686	
1558		nu hat (KM)	32.04							nu star (KM)	28.8	
1559		theta hat (KM)	0.101							theta star (KM)	0.112	
1560		80% gamma percentile (KM)	0.127							90% gamma percentile (KM)	0.194	
1561		95% gamma percentile (KM)	0.264							99% gamma percentile (KM)	0.432	
1562												
1563	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1564		Approximate Chi Square Value (28.80, $\alpha$ )	17.55							Adjusted Chi Square Value (28.80, $\beta$ )	16.88	
1565		95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	0.127							95% Gamma Adjusted KM-UCL (use when $n < 50$ )	0.132	
1566												
1567	<b>Lognormal GOF Test on Detected Observations Only</b>											
1568		Shapiro Wilk Test Statistic	0.921							<b>Shapiro Wilk GOF Test</b>		
1569		5% Shapiro Wilk Critical Value	0.892							Detected Data appear Lognormal at 5% Significance Level		
1570		Lilliefors Test Statistic	0.179							<b>Lilliefors GOF Test</b>		
1571		5% Lilliefors Critical Value	0.207							Detected Data appear Lognormal at 5% Significance Level		
1572	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1573												
1574	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1575		Mean in Original Scale	0.0774							Mean in Log Scale	-2.926	
1576		SD in Original Scale	0.0903							SD in Log Scale	0.79	
1577		95% t UCL (assumes normality of ROS data)	0.111							95% Percentile Bootstrap UCL	0.112	
1578		95% BCA Bootstrap UCL	0.127							95% Bootstrap t UCL	0.149	
1579		95% H-UCL (Log ROS)	0.11									
1580												
1581	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1582		KM Mean (logged)	-2.937							KM Geo Mean	0.053	
1583		KM SD (logged)	0.778							95% Critical H Value (KM-Log)	2.281	
1584		KM Standard Error of Mean (logged)	0.177							95% H-UCL (KM -Log)	0.107	
1585		KM SD (logged)	0.778							95% Critical H Value (KM-Log)	2.281	
1586		KM Standard Error of Mean (logged)	0.177									
1587												
1588	<b>DL/2 Statistics</b>											
1589	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1590		Mean in Original Scale	0.0754							Mean in Log Scale	-2.997	

	A	B	C	D	E	F	G	H	I	J	K	L
1591	SD in Original Scale				0.0914	SD in Log Scale				0.846		
1592	95% t UCL (Assumes normality)				0.11	95% H-Stat UCL				0.112		
1593	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1594												
1595	<b>Nonparametric Distribution Free UCL Statistics</b>											
1596	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											
1597												
1598	<b>Suggested UCL to Use</b>											
1599	95% KM Adjusted Gamma UCL				0.132	95% GROS Adjusted Gamma UCL				0.113		
1600												
1601	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1602	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1603												
1604	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1605	Recommendations are based upon data size, data distribution, and skewness.											
1606	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1607	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1608												
1609	<b>4,4'-DDT (p,p'-DDT)</b>											
1610												
1611	<b>General Statistics</b>											
1612	Total Number of Observations				34	Number of Distinct Observations				19		
1613	Number of Detects				8	Number of Non-Detects				26		
1614	Number of Distinct Detects				7	Number of Distinct Non-Detects				15		
1615	Minimum Detect				0.0041	Minimum Non-Detect				0.0045		
1616	Maximum Detect				54	Maximum Non-Detect				0.012		
1617	Variance Detects				364.3	Percent Non-Detects				76.47%		
1618	Mean Detects				6.764	SD Detects				19.09		
1619	Median Detects				0.011	CV Detects				2.822		
1620	Skewness Detects				2.828	Kurtosis Detects				8		
1621	Mean of Logged Detects				-3.46	SD of Logged Detects				3.113		
1622												
1623	<b>Normal GOF Test on Detects Only</b>											
1624	Shapiro Wilk Test Statistic				0.419	<b>Shapiro Wilk GOF Test</b>						
1625	5% Shapiro Wilk Critical Value				0.818	Detected Data Not Normal at 5% Significance Level						
1626	Lilliefors Test Statistic				0.512	<b>Lilliefors GOF Test</b>						
1627	5% Lilliefors Critical Value				0.283	Detected Data Not Normal at 5% Significance Level						
1628	<b>Detected Data Not Normal at 5% Significance Level</b>											
1629												
1630	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1631	KM Mean				1.595	KM Standard Error of Mean				1.673		
1632	KM SD				9.123	95% KM (BCA) UCL				4.771		
1633	95% KM (t) UCL				4.425	95% KM (Percentile Bootstrap) UCL				4.77		
1634	95% KM (z) UCL				4.346	95% KM Bootstrap t UCL				6.116		
1635	90% KM Chebyshev UCL				6.612	95% KM Chebyshev UCL				8.885		
1636	97.5% KM Chebyshev UCL				12.04	99% KM Chebyshev UCL				18.24		
1637												
1638	<b>Gamma GOF Tests on Detected Observations Only</b>											
1639	A-D Test Statistic				2.017	<b>Anderson-Darling GOF Test</b>						
1640	5% A-D Critical Value				0.887	Detected Data Not Gamma Distributed at 5% Significance Level						
1641	K-S Test Statistic				0.465	<b>Kolmogorov-Smirnov GOF</b>						
1642	5% K-S Critical Value				0.33	Detected Data Not Gamma Distributed at 5% Significance Level						
1643	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											

	A	B	C	D	E	F	G	H	I	J	K	L	
1644													
1645	<b>Gamma Statistics on Detected Data Only</b>												
1646					k hat (MLE)	0.144					k star (bias corrected MLE)	0.173	
1647					Theta hat (MLE)	46.99					Theta star (bias corrected MLE)	39.03	
1648					nu hat (MLE)	2.303					nu star (bias corrected)	2.773	
1649					Mean (detects)	6.764							
1650													
1651	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
1652	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1653	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1654	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1655	This is especially true when the sample size is small.												
1656	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1657					Minimum	0.0041					Mean	1.599	
1658					Maximum	54					Median	0.01	
1659					SD	9.259					CV	5.79	
1660					k hat (MLE)	0.159					k star (bias corrected MLE)	0.164	
1661					Theta hat (MLE)	10.08					Theta star (bias corrected MLE)	9.736	
1662					nu hat (MLE)	10.79					nu star (bias corrected)	11.17	
1663					Adjusted Level of Significance ( $\beta$ )	0.0422							
1664					Approximate Chi Square Value (11.17, $\alpha$ )	4.685					Adjusted Chi Square Value (11.17, $\beta$ )	4.478	
1665					95% Gamma Approximate UCL (use when $n \geq 50$ )	3.813					95% Gamma Adjusted UCL (use when $n < 50$ )	3.989	
1666													
1667	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1668					Mean (KM)	1.595					SD (KM)	9.123	
1669					Variance (KM)	83.22					SE of Mean (KM)	1.673	
1670					k hat (KM)	0.0306					k star (KM)	0.0475	
1671					nu hat (KM)	2.078					nu star (KM)	3.228	
1672					theta hat (KM)	52.19					theta star (KM)	33.59	
1673					80% gamma percentile (KM)	0.179					90% gamma percentile (KM)	2.269	
1674					95% gamma percentile (KM)	8.315					99% gamma percentile (KM)	35.4	
1675													
1676	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1677					Approximate Chi Square Value (3.23, $\alpha$ )	0.443					Adjusted Chi Square Value (3.23, $\beta$ )	0.4	
1678					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	11.62					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	12.88	
1679	95% Gamma Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ )												
1680													
1681	<b>Lognormal GOF Test on Detected Observations Only</b>												
1682					Shapiro Wilk Test Statistic	0.633					<b>Shapiro Wilk GOF Test</b>		
1683					5% Shapiro Wilk Critical Value	0.818					Detected Data Not Lognormal at 5% Significance Level		
1684					Lilliefors Test Statistic	0.371					<b>Lilliefors GOF Test</b>		
1685					5% Lilliefors Critical Value	0.283					Detected Data Not Lognormal at 5% Significance Level		
1686	<b>Detected Data Not Lognormal at 5% Significance Level</b>												
1687													
1688	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1689					Mean in Original Scale	1.592					Mean in Log Scale	-6.684	
1690					SD in Original Scale	9.26					SD in Log Scale	2.498	
1691					95% t UCL (assumes normality of ROS data)	4.28					95% Percentile Bootstrap UCL	4.767	
1692					95% BCA Bootstrap UCL	6.358					95% Bootstrap t UCL	4536	
1693					95% H-UCL (Log ROS)	0.215							
1694													
1695	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1696					KM Mean (logged)	-5.008					KM Geo Mean	0.00668	

	A	B	C	D	E	F	G	H	I	J	K	L
1697					KM SD (logged)	1.655					95% Critical H Value (KM-Log)	3.344
1698					KM Standard Error of Mean (logged)	0.304					95% H-UCL (KM -Log)	0.0688
1699					KM SD (logged)	1.655					95% Critical H Value (KM-Log)	3.344
1700					KM Standard Error of Mean (logged)	0.304						
1701												
1702	<b>DL/2 Statistics</b>											
1703	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1704					Mean in Original Scale	1.594					Mean in Log Scale	-5.29
1705					SD in Original Scale	9.26					SD in Log Scale	1.782
1706					95% t UCL (Assumes normality)	4.281					95% H-Stat UCL	0.0739
1707	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1708												
1709	<b>Nonparametric Distribution Free UCL Statistics</b>											
1710	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
1711												
1712	<b>Suggested UCL to Use</b>											
1713					99% KM (Chebyshev) UCL	18.24						
1714												
1715	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1716	Recommendations are based upon data size, data distribution, and skewness.											
1717	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1718	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1719												
1720	<b>4,4-DDD (p,p-DDD)</b>											
1721												
1722	<b>General Statistics</b>											
1723					Total Number of Observations	33					Number of Distinct Observations	22
1724					Number of Detects	4					Number of Non-Detects	29
1725					Number of Distinct Detects	4					Number of Distinct Non-Detects	18
1726					Minimum Detect	0.0086					Minimum Non-Detect	0.0059
1727					Maximum Detect	18					Maximum Non-Detect	0.012
1728					Variance Detects	80.9					Percent Non-Detects	87.88%
1729					Mean Detects	4.508					SD Detects	8.995
1730					Median Detects	0.0121					CV Detects	1.995
1731					Skewness Detects	2					Kurtosis Detects	4
1732					Mean of Logged Detects	-2.688					SD of Logged Detects	3.727
1733												
1734	<b>Normal GOF Test on Detects Only</b>											
1735					Shapiro Wilk Test Statistic	0.63					<b>Shapiro Wilk GOF Test</b>	
1736					5% Shapiro Wilk Critical Value	0.748					Detected Data Not Normal at 5% Significance Level	
1737					Lilliefors Test Statistic	0.441					<b>Lilliefors GOF Test</b>	
1738					5% Lilliefors Critical Value	0.375					Detected Data Not Normal at 5% Significance Level	
1739	<b>Detected Data Not Normal at 5% Significance Level</b>											
1740												
1741	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1742					KM Mean	0.552					KM Standard Error of Mean	0.62
1743					KM SD	3.084					95% KM (BCA) UCL	N/A
1744					95% KM (t) UCL	1.602					95% KM (Percentile Bootstrap) UCL	N/A
1745					95% KM (z) UCL	1.571					95% KM Bootstrap t UCL	N/A
1746					90% KM Chebyshev UCL	2.412					95% KM Chebyshev UCL	3.254
1747					97.5% KM Chebyshev UCL	4.424					99% KM Chebyshev UCL	6.721
1748												
1749	<b>Gamma GOF Tests on Detected Observations Only</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1750	A-D Test Statistic					0.847	<b>Anderson-Darling GOF Test</b>					
1751	5% A-D Critical Value					0.749	Detected Data Not Gamma Distributed at 5% Significance Level					
1752	K-S Test Statistic					0.463	<b>Kolmogorov-Smirnov GOF</b>					
1753	5% K-S Critical Value					0.427	Detected Data Not Gamma Distributed at 5% Significance Level					
1754	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
1755												
1756	<b>Gamma Statistics on Detected Data Only</b>											
1757	k hat (MLE)					0.179	k star (bias corrected MLE)					0.211
1758	Theta hat (MLE)					25.25	Theta star (bias corrected MLE)					21.34
1759	nu hat (MLE)					1.428	nu star (bias corrected)					1.69
1760	Mean (detects)					4.508						
1761												
1762	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1763	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1764	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1765	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1766	This is especially true when the sample size is small.											
1767	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1768	Minimum					0.0086	Mean					0.555
1769	Maximum					18	Median					0.01
1770	SD					3.132	CV					5.64
1771	k hat (MLE)					0.195	k star (bias corrected MLE)					0.198
1772	Theta hat (MLE)					2.845	Theta star (bias corrected MLE)					2.809
1773	nu hat (MLE)					12.88	nu star (bias corrected)					13.05
1774	Adjusted Level of Significance ( $\beta$ )					0.0419						
1775	Approximate Chi Square Value (13.05, $\alpha$ )					5.923	Adjusted Chi Square Value (13.05, $\beta$ )					5.676
1776	95% Gamma Approximate UCL (use when $n \geq 50$ )					1.223	95% Gamma Adjusted UCL (use when $n < 50$ )					N/A
1777												
1778	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1779	Mean (KM)					0.552	SD (KM)					3.084
1780	Variance (KM)					9.514	SE of Mean (KM)					0.62
1781	k hat (KM)					0.032	k star (KM)					0.0493
1782	nu hat (KM)					2.111	nu star (KM)					3.253
1783	theta hat (KM)					17.25	theta star (KM)					11.19
1784	80% gamma percentile (KM)					0.0711	90% gamma percentile (KM)					0.826
1785	95% gamma percentile (KM)					2.919	99% gamma percentile (KM)					12.07
1786												
1787	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1788	Approximate Chi Square Value (3.25, $\alpha$ )					0.451	Adjusted Chi Square Value (3.25, $\beta$ )					0.405
1789	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					3.978	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					4.428
1790	95% Gamma Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ )											
1791												
1792	<b>Lognormal GOF Test on Detected Observations Only</b>											
1793	Shapiro Wilk Test Statistic					0.683	<b>Shapiro Wilk GOF Test</b>					
1794	5% Shapiro Wilk Critical Value					0.748	Detected Data Not Lognormal at 5% Significance Level					
1795	Lilliefors Test Statistic					0.407	<b>Lilliefors GOF Test</b>					
1796	5% Lilliefors Critical Value					0.375	Detected Data Not Lognormal at 5% Significance Level					
1797	<b>Detected Data Not Lognormal at 5% Significance Level</b>											
1798												
1799	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1800	Mean in Original Scale					0.546	Mean in Log Scale					-15.45
1801	SD in Original Scale					3.133	SD in Log Scale					5.705
1802	95% t UCL (assumes normality of ROS data)					1.47	95% Percentile Bootstrap UCL					1.637

	A	B	C	D	E	F	G	H	I	J	K	L
1803	95% BCA Bootstrap UCL					2.183	95% Bootstrap t UCL					793.3
1804	95% H-UCL (Log ROS)					53668						
1805												
1806	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1807	KM Mean (logged)				-4.829	KM Geo Mean					0.00799	
1808	KM SD (logged)				1.378	95% Critical H Value (KM-Log)					2.932	
1809	KM Standard Error of Mean (logged)				0.277	95% H-UCL (KM -Log)					0.0422	
1810	KM SD (logged)				1.378	95% Critical H Value (KM-Log)					2.932	
1811	KM Standard Error of Mean (logged)				0.277							
1812												
1813	<b>DL/2 Statistics</b>											
1814	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
1815	Mean in Original Scale				0.55	Mean in Log Scale					-5.242	
1816	SD in Original Scale				3.133	SD in Log Scale					1.504	
1817	95% t UCL (Assumes normality)				1.473	95% H-Stat UCL					0.0375	
1818	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1819												
1820	<b>Nonparametric Distribution Free UCL Statistics</b>											
1821	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
1822												
1823	<b>Suggested UCL to Use</b>											
1824	99% KM (Chebyshev) UCL				6.721							
1825												
1826	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1827	Recommendations are based upon data size, data distribution, and skewness.											
1828	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1829	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1830												
1831	<b>Endrin</b>											
1832												
1833	<b>General Statistics</b>											
1834	Total Number of Observations				33	Number of Distinct Observations					21	
1835	Number of Detects				3	Number of Non-Detects					30	
1836	Number of Distinct Detects				3	Number of Distinct Non-Detects					18	
1837	Minimum Detect				0.0081	Minimum Non-Detect					0.0055	
1838	Maximum Detect				10	Maximum Non-Detect					0.012	
1839	Variance Detects				33.21	Percent Non-Detects					90.91%	
1840	Mean Detects				3.345	SD Detects					5.763	
1841	Median Detects				0.028	CV Detects					1.723	
1842	Skewness Detects				1.732	Kurtosis Detects					N/A	
1843	Mean of Logged Detects				-2.03	SD of Logged Detects					3.803	
1844												
1845	<b>Warning: Data set has only 3 Detected Values.</b>											
1846	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											
1847												
1848												
1849	<b>Normal GOF Test on Detects Only</b>											
1850	Shapiro Wilk Test Statistic				0.751	<b>Shapiro Wilk GOF Test</b>						
1851	5% Shapiro Wilk Critical Value				0.767	Detected Data Not Normal at 5% Significance Level						
1852	Lilliefors Test Statistic				0.384	<b>Lilliefors GOF Test</b>						
1853	5% Lilliefors Critical Value				0.425	Detected Data appear Normal at 5% Significance Level						
1854	<b>Detected Data appear Approximate Normal at 5% Significance Level</b>											
1855												

	A	B	C	D	E	F	G	H	I	J	K	L	
1856	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
1857	KM Mean				0.309	KM Standard Error of Mean				0.365			
1858	KM SD				1.713	95% KM (BCA) UCL				N/A			
1859	95% KM (t) UCL				0.928	95% KM (Percentile Bootstrap) UCL				N/A			
1860	95% KM (z) UCL				0.91	95% KM Bootstrap t UCL				N/A			
1861	90% KM Chebyshev UCL				1.405	95% KM Chebyshev UCL				1.901			
1862	97.5% KM Chebyshev UCL				2.59	99% KM Chebyshev UCL				3.943			
1863													
1864	<b>Gamma GOF Tests on Detected Observations Only</b>												
1865	<b>Not Enough Data to Perform GOF Test</b>												
1866													
1867	<b>Gamma Statistics on Detected Data Only</b>												
1868	k hat (MLE)				0.223	k star (bias corrected MLE)				N/A			
1869	Theta hat (MLE)				14.97	Theta star (bias corrected MLE)				N/A			
1870	nu hat (MLE)				1.34	nu star (bias corrected)				N/A			
1871	Mean (detects)				3.345								
1872													
1873	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
1874	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1875	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1876	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1877	This is especially true when the sample size is small.												
1878	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1879	Minimum				0.0081	Mean				0.313			
1880	Maximum				10	Median				0.01			
1881	SD				1.739	CV				5.552			
1882	k hat (MLE)				0.225	k star (bias corrected MLE)				0.225			
1883	Theta hat (MLE)				1.392	Theta star (bias corrected MLE)				1.393			
1884	nu hat (MLE)				14.85	nu star (bias corrected)				14.83			
1885	Adjusted Level of Significance ( $\beta$ )				0.0419								
1886	Approximate Chi Square Value (14.83, $\alpha$ )				7.147	Adjusted Chi Square Value (14.83, $\beta$ )				6.872			
1887	95% Gamma Approximate UCL (use when $n \geq 50$ )				0.65	95% Gamma Adjusted UCL (use when $n < 50$ )				N/A			
1888													
1889	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1890	Mean (KM)				0.309	SD (KM)				1.713			
1891	Variance (KM)				2.935	SE of Mean (KM)				0.365			
1892	k hat (KM)				0.0326	k star (KM)				0.0498			
1893	nu hat (KM)				2.149	nu star (KM)				3.287			
1894	theta hat (KM)				9.493	theta star (KM)				6.207			
1895	80% gamma percentile (KM)				0.0414	90% gamma percentile (KM)				0.469			
1896	95% gamma percentile (KM)				1.642	99% gamma percentile (KM)				6.735			
1897													
1898	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1899	Approximate Chi Square Value (3.29, $\alpha$ )				0.462	Adjusted Chi Square Value (3.29, $\beta$ )				0.416			
1900	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				2.198	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				2.445			
1901	95% Gamma Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ )												
1902													
1903	<b>Lognormal GOF Test on Detected Observations Only</b>												
1904	Shapiro Wilk Test Statistic				0.876	<b>Shapiro Wilk GOF Test</b>							
1905	5% Shapiro Wilk Critical Value				0.767	Detected Data appear Lognormal at 5% Significance Level							
1906	Lilliefors Test Statistic				0.324	<b>Lilliefors GOF Test</b>							
1907	5% Lilliefors Critical Value				0.425	Detected Data appear Lognormal at 5% Significance Level							
1908	<b>Detected Data appear Lognormal at 5% Significance Level</b>												

	A	B	C	D	E	F	G	H	I	J	K	L	
1909													
1910	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1911	Mean in Original Scale				0.304	Mean in Log Scale				-20.76			
1912	SD in Original Scale				1.741	SD in Log Scale				7.261			
1913	95% t UCL (assumes normality of ROS data)				0.817	95% Percentile Bootstrap UCL				0.91			
1914	95% BCA Bootstrap UCL				1.515	95% Bootstrap t UCL				375.4			
1915	95% H-UCL (Log ROS)				3.037E+9								
1916													
1917	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1918	KM Mean (logged)				-4.912	KM Geo Mean				0.00736			
1919	KM SD (logged)				1.307	95% Critical H Value (KM-Log)				2.836			
1920	KM Standard Error of Mean (logged)				0.279	95% H-UCL (KM -Log)				0.0333			
1921	KM SD (logged)				1.307	95% Critical H Value (KM-Log)				2.836			
1922	KM Standard Error of Mean (logged)				0.279								
1923													
1924	<b>DL/2 Statistics</b>												
1925	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>						
1926	Mean in Original Scale				0.307	Mean in Log Scale				-5.348			
1927	SD in Original Scale				1.74	SD in Log Scale				1.442			
1928	95% t UCL (Assumes normality)				0.82	95% H-Stat UCL				0.0291			
1929	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
1930													
1931	<b>Nonparametric Distribution Free UCL Statistics</b>												
1932	<b>Detected Data appear Approximate Normal Distributed at 5% Significance Level</b>												
1933													
1934	<b>Suggested UCL to Use</b>												
1935	95% KM (t) UCL				0.928								
1936													
1937	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test												
1938	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL												
1939													
1940	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1941	Recommendations are based upon data size, data distribution, and skewness.												
1942	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1943	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
1944													
1945	<b>Benzo(a)anthracene</b>												
1946													
1947	<b>General Statistics</b>												
1948	Total Number of Observations				38	Number of Distinct Observations				31			
1949	Number of Detects				37	Number of Non-Detects				1			
1950	Number of Distinct Detects				30	Number of Distinct Non-Detects				1			
1951	Minimum Detect				0.057	Minimum Non-Detect				0.51			
1952	Maximum Detect				39	Maximum Non-Detect				0.51			
1953	Variance Detects				40.14	Percent Non-Detects				2.632%			
1954	Mean Detects				2.336	SD Detects				6.335			
1955	Median Detects				0.74	CV Detects				2.712			
1956	Skewness Detects				5.68	Kurtosis Detects				33.55			
1957	Mean of Logged Detects				-0.0837	SD of Logged Detects				1.186			
1958													
1959	<b>Normal GOF Test on Detects Only</b>												
1960	Shapiro Wilk Test Statistic				0.315	<b>Shapiro Wilk GOF Test</b>							
1961	5% Shapiro Wilk Critical Value				0.936	Detected Data Not Normal at 5% Significance Level							



	A	B	C	D	E	F	G	H	I	J	K	L
1962	Lilliefors Test Statistic					0.36	Lilliefors GOF Test					
1963	5% Lilliefors Critical Value					0.144	Detected Data Not Normal at 5% Significance Level					
1964	Detected Data Not Normal at 5% Significance Level											
1965												
1966	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1967	KM Mean					2.282	KM Standard Error of Mean					1.016
1968	KM SD					6.175	95% KM (BCA) UCL					4.307
1969	95% KM (t) UCL					3.995	95% KM (Percentile Bootstrap) UCL					4.208
1970	95% KM (z) UCL					3.952	95% KM Bootstrap t UCL					9.15
1971	90% KM Chebyshev UCL					5.329	95% KM Chebyshev UCL					6.709
1972	97.5% KM Chebyshev UCL					8.624	99% KM Chebyshev UCL					12.39
1973												
1974	Gamma GOF Tests on Detected Observations Only											
1975	A-D Test Statistic					2.608	Anderson-Darling GOF Test					
1976	5% A-D Critical Value					0.798	Detected Data Not Gamma Distributed at 5% Significance Level					
1977	K-S Test Statistic					0.239	Kolmogorov-Smirnov GOF					
1978	5% K-S Critical Value					0.152	Detected Data Not Gamma Distributed at 5% Significance Level					
1979	Detected Data Not Gamma Distributed at 5% Significance Level											
1980												
1981	Gamma Statistics on Detected Data Only											
1982	k hat (MLE)					0.654	k star (bias corrected MLE)					0.619
1983	Theta hat (MLE)					3.569	Theta star (bias corrected MLE)					3.771
1984	nu hat (MLE)					48.43	nu star (bias corrected)					45.84
1985	Mean (detects)					2.336						
1986												
1987	Gamma ROS Statistics using Imputed Non-Detects											
1988	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1989	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1990	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1991	This is especially true when the sample size is small.											
1992	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1993	Minimum					0.01	Mean					2.275
1994	Maximum					39	Median					0.73
1995	SD					6.261	CV					2.752
1996	k hat (MLE)					0.603	k star (bias corrected MLE)					0.573
1997	Theta hat (MLE)					3.775	Theta star (bias corrected MLE)					3.973
1998	nu hat (MLE)					45.8	nu star (bias corrected)					43.52
1999	Adjusted Level of Significance ( $\beta$ )					0.0434						
2000	Approximate Chi Square Value (43.52, $\alpha$ )					29.39	Adjusted Chi Square Value (43.52, $\beta$ )					28.91
2001	95% Gamma Approximate UCL (use when $n \geq 50$ )					3.368	95% Gamma Adjusted UCL (use when $n < 50$ )					3.425
2002												
2003	Estimates of Gamma Parameters using KM Estimates											
2004	Mean (KM)					2.282	SD (KM)					6.175
2005	Variance (KM)					38.14	SE of Mean (KM)					1.016
2006	k hat (KM)					0.137	k star (KM)					0.143
2007	nu hat (KM)					10.38	nu star (KM)					10.89
2008	theta hat (KM)					16.71	theta star (KM)					15.92
2009	80% gamma percentile (KM)					2.389	90% gamma percentile (KM)					6.719
2010	95% gamma percentile (KM)					12.67	99% gamma percentile (KM)					30.09
2011												
2012	Gamma Kaplan-Meier (KM) Statistics											
2013	Approximate Chi Square Value (10.89, $\alpha$ )					4.505	Adjusted Chi Square Value (10.89, $\beta$ )					4.336
2014	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					5.515	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					5.731

	A	B	C	D	E	F	G	H	I	J	K	L
2015												
2016	<b>Lognormal GOF Test on Detected Observations Only</b>											
2017	Shapiro Wilk Test Statistic				0.964		<b>Shapiro Wilk GOF Test</b>					
2018	5% Shapiro Wilk Critical Value				0.936		Detected Data appear Lognormal at 5% Significance Level					
2019	Lilliefors Test Statistic				0.127		<b>Lilliefors GOF Test</b>					
2020	5% Lilliefors Critical Value				0.144		Detected Data appear Lognormal at 5% Significance Level					
2021	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2022												
2023	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2024	Mean in Original Scale				2.281		Mean in Log Scale				-0.121	
2025	SD in Original Scale				6.259		SD in Log Scale				1.193	
2026	95% t UCL (assumes normality of ROS data)				3.993		95% Percentile Bootstrap UCL				4.221	
2027	95% BCA Bootstrap UCL				5.409		95% Bootstrap t UCL				9.47	
2028	95% H-UCL (Log ROS)				3.019							
2029												
2030	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2031	KM Mean (logged)				-0.12		KM Geo Mean				0.887	
2032	KM SD (logged)				1.18		95% Critical H Value (KM-Log)				2.61	
2033	KM Standard Error of Mean (logged)				0.195		95% H-UCL (KM -Log)				2.951	
2034	KM SD (logged)				1.18		95% Critical H Value (KM-Log)				2.61	
2035	KM Standard Error of Mean (logged)				0.195							
2036												
2037	<b>DL/2 Statistics</b>											
2038	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2039	Mean in Original Scale				2.281		Mean in Log Scale				-0.117	
2040	SD in Original Scale				6.258		SD in Log Scale				1.189	
2041	95% t UCL (Assumes normality)				3.994		95% H-Stat UCL				3.008	
2042	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2043												
2044	<b>Nonparametric Distribution Free UCL Statistics</b>											
2045	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>											
2046												
2047	<b>Suggested UCL to Use</b>											
2048	KM H-UCL				2.951							
2049												
2050	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2051	Recommendations are based upon data size, data distribution, and skewness.											
2052	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2053	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2054												
2055	<b>Benzo(b)fluoranthene</b>											
2056												
2057	<b>General Statistics</b>											
2058	Total Number of Observations				38		Number of Distinct Observations				31	
2059	Number of Detects				37		Number of Non-Detects				1	
2060	Number of Distinct Detects				31		Number of Distinct Non-Detects				1	
2061	Minimum Detect				0.069		Minimum Non-Detect				0.51	
2062	Maximum Detect				34		Maximum Non-Detect				0.51	
2063	Variance Detects				30.52		Percent Non-Detects				2.632%	
2064	Mean Detects				2.521		SD Detects				5.525	
2065	Median Detects				1		CV Detects				2.191	
2066	Skewness Detects				5.419		Kurtosis Detects				31.34	
2067	Mean of Logged Detects				0.179		SD of Logged Detects				1.123	

	A	B	C	D	E	F	G	H	I	J	K	L
2068												
2069	<b>Normal GOF Test on Detects Only</b>											
2070	Shapiro Wilk Test Statistic					0.37	<b>Shapiro Wilk GOF Test</b>					
2071	5% Shapiro Wilk Critical Value					0.936	Detected Data Not Normal at 5% Significance Level					
2072	Lilliefors Test Statistic					0.329	<b>Lilliefors GOF Test</b>					
2073	5% Lilliefors Critical Value					0.144	Detected Data Not Normal at 5% Significance Level					
2074	<b>Detected Data Not Normal at 5% Significance Level</b>											
2075												
2076	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2077	KM Mean					2.463	KM Standard Error of Mean					0.886
2078	KM SD					5.389	95% KM (BCA) UCL					4.356
2079	95% KM (t) UCL					3.958	95% KM (Percentile Bootstrap) UCL					4.157
2080	95% KM (z) UCL					3.92	95% KM Bootstrap t UCL					7.385
2081	90% KM Chebyshev UCL					5.122	95% KM Chebyshev UCL					6.326
2082	97.5% KM Chebyshev UCL					7.998	99% KM Chebyshev UCL					11.28
2083												
2084	<b>Gamma GOF Tests on Detected Observations Only</b>											
2085	A-D Test Statistic					1.828	<b>Anderson-Darling GOF Test</b>					
2086	5% A-D Critical Value					0.786	Detected Data Not Gamma Distributed at 5% Significance Level					
2087	K-S Test Statistic					0.195	<b>Kolmogorov-Smirnov GOF</b>					
2088	5% K-S Critical Value					0.15	Detected Data Not Gamma Distributed at 5% Significance Level					
2089	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2090												
2091	<b>Gamma Statistics on Detected Data Only</b>											
2092	k hat (MLE)					0.796	k star (bias corrected MLE)					0.75
2093	Theta hat (MLE)					3.166	Theta star (bias corrected MLE)					3.363
2094	nu hat (MLE)					58.92	nu star (bias corrected)					55.48
2095	Mean (detects)					2.521						
2096												
2097	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2098	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2099	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2100	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2101	This is especially true when the sample size is small.											
2102	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2103	Minimum					0.01	Mean					2.455
2104	Maximum					34	Median					1
2105	SD					5.465	CV					2.226
2106	k hat (MLE)					0.713	k star (bias corrected MLE)					0.674
2107	Theta hat (MLE)					3.442	Theta star (bias corrected MLE)					3.64
2108	nu hat (MLE)					54.2	nu star (bias corrected)					51.26
2109	Adjusted Level of Significance ( $\beta$ )					0.0434						
2110	Approximate Chi Square Value (51.26, $\alpha$ )					35.81	Adjusted Chi Square Value (51.26, $\beta$ )					35.28
2111	95% Gamma Approximate UCL (use when $n \geq 50$ )					3.513	95% Gamma Adjusted UCL (use when $n < 50$ )					3.567
2112												
2113	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2114	Mean (KM)					2.463	SD (KM)					5.389
2115	Variance (KM)					29.04	SE of Mean (KM)					0.886
2116	k hat (KM)					0.209	k star (KM)					0.21
2117	nu hat (KM)					15.87	nu star (KM)					15.95
2118	theta hat (KM)					11.79	theta star (KM)					11.73
2119	80% gamma percentile (KM)					3.325	90% gamma percentile (KM)					7.447
2120	95% gamma percentile (KM)					12.53	99% gamma percentile (KM)					26.41

	A	B	C	D	E	F	G	H	I	J	K	L
2121												
2122	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2123	Approximate Chi Square Value (15.95, $\alpha$ )					7.927	Adjusted Chi Square Value (15.95, $\beta$ )					7.693
2124	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					4.955	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					5.106
2125												
2126	<b>Lognormal GOF Test on Detected Observations Only</b>											
2127	Shapiro Wilk Test Statistic					0.974	<b>Shapiro Wilk GOF Test</b>					
2128	5% Shapiro Wilk Critical Value					0.936	Detected Data appear Lognormal at 5% Significance Level					
2129	Lilliefors Test Statistic					0.1	<b>Lilliefors GOF Test</b>					
2130	5% Lilliefors Critical Value					0.144	Detected Data appear Lognormal at 5% Significance Level					
2131	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2132												
2133	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2134	Mean in Original Scale					2.462	Mean in Log Scale					0.139
2135	SD in Original Scale					5.462	SD in Log Scale					1.135
2136	95% t UCL (assumes normality of ROS data)					3.956	95% Percentile Bootstrap UCL					4.071
2137	95% BCA Bootstrap UCL					5.092	95% Bootstrap t UCL					7.14
2138	95% H-UCL (Log ROS)					3.524						
2139												
2140	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2141	KM Mean (logged)					0.139	KM Geo Mean					1.149
2142	KM SD (logged)					1.125	95% Critical H Value (KM-Log)					2.542
2143	KM Standard Error of Mean (logged)					0.186	95% H-UCL (KM -Log)					3.46
2144	KM SD (logged)					1.125	95% Critical H Value (KM-Log)					2.542
2145	KM Standard Error of Mean (logged)					0.186						
2146												
2147	<b>DL/2 Statistics</b>											
2148	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2149	Mean in Original Scale					2.461	Mean in Log Scale					0.138
2150	SD in Original Scale					5.462	SD in Log Scale					1.136
2151	95% t UCL (Assumes normality)					3.956	95% H-Stat UCL					3.528
2152	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2153												
2154	<b>Nonparametric Distribution Free UCL Statistics</b>											
2155	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>											
2156												
2157	<b>Suggested UCL to Use</b>											
2158	KM H-UCL					3.46						
2159												
2160	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2161	Recommendations are based upon data size, data distribution, and skewness.											
2162	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2163	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2164												
2165	<b>Benzo(k)fluoranthene</b>											
2166												
2167	<b>General Statistics</b>											
2168	Total Number of Observations					32	Number of Distinct Observations					25
2169	Number of Detects					30	Number of Non-Detects					2
2170	Number of Distinct Detects					23	Number of Distinct Non-Detects					2
2171	Minimum Detect					0.054	Minimum Non-Detect					0.44
2172	Maximum Detect					14	Maximum Non-Detect					0.51
2173	Variance Detects					6.192	Percent Non-Detects					6.25%

	A	B	C	D	E	F	G	H	I	J	K	L
2174					Mean Detects	1.176					SD Detects	2.488
2175					Median Detects	0.505					CV Detects	2.116
2176					Skewness Detects	5.033					Kurtosis Detects	26.6
2177					Mean of Logged Detects	-0.521					SD of Logged Detects	1.032
2178												
2179	<b>Normal GOF Test on Detects Only</b>											
2180					Shapiro Wilk Test Statistic	0.368					<b>Shapiro Wilk GOF Test</b>	
2181					5% Shapiro Wilk Critical Value	0.927					Detected Data Not Normal at 5% Significance Level	
2182					Lilliefors Test Statistic	0.352					<b>Lilliefors GOF Test</b>	
2183					5% Lilliefors Critical Value	0.159					Detected Data Not Normal at 5% Significance Level	
2184	<b>Detected Data Not Normal at 5% Significance Level</b>											
2185												
2186	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2187					KM Mean	1.121					KM Standard Error of Mean	0.428
2188					KM SD	2.379					95% KM (BCA) UCL	1.982
2189					95% KM (t) UCL	1.846					95% KM (Percentile Bootstrap) UCL	1.921
2190					95% KM (z) UCL	1.824					95% KM Bootstrap t UCL	3.614
2191					90% KM Chebyshev UCL	2.404					95% KM Chebyshev UCL	2.985
2192					97.5% KM Chebyshev UCL	3.792					99% KM Chebyshev UCL	5.376
2193												
2194	<b>Gamma GOF Tests on Detected Observations Only</b>											
2195					A-D Test Statistic	1.866					<b>Anderson-Darling GOF Test</b>	
2196					5% A-D Critical Value	0.782					Detected Data Not Gamma Distributed at 5% Significance Level	
2197					K-S Test Statistic	0.211					<b>Kolmogorov-Smirnov GOF</b>	
2198					5% K-S Critical Value	0.166					Detected Data Not Gamma Distributed at 5% Significance Level	
2199	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2200												
2201	<b>Gamma Statistics on Detected Data Only</b>											
2202					k hat (MLE)	0.861					k star (bias corrected MLE)	0.797
2203					Theta hat (MLE)	1.365					Theta star (bias corrected MLE)	1.475
2204					nu hat (MLE)	51.68					nu star (bias corrected)	47.84
2205					Mean (detects)	1.176						
2206												
2207	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2208	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2209	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2210	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2211	This is especially true when the sample size is small.											
2212	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2213					Minimum	0.01					Mean	1.103
2214					Maximum	14					Median	0.44
2215					SD	2.424					CV	2.198
2216					k hat (MLE)	0.693					k star (bias corrected MLE)	0.649
2217					Theta hat (MLE)	1.592					Theta star (bias corrected MLE)	1.701
2218					nu hat (MLE)	44.33					nu star (bias corrected)	41.51
2219					Adjusted Level of Significance ( $\beta$ )	0.0416						
2220					Approximate Chi Square Value (41.51, $\alpha$ )	27.74					Adjusted Chi Square Value (41.51, $\beta$ )	27.14
2221					95% Gamma Approximate UCL (use when $n \geq 50$ )	1.65					95% Gamma Adjusted UCL (use when $n < 50$ )	1.687
2222												
2223	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2224					Mean (KM)	1.121					SD (KM)	2.379
2225					Variance (KM)	5.657					SE of Mean (KM)	0.428
2226					k hat (KM)	0.222					k star (KM)	0.222

	A	B	C	D	E	F	G	H	I	J	K	L	
2227					nu hat (KM)	14.21					nu star (KM)	14.21	
2228					theta hat (KM)	5.047					theta star (KM)	5.047	
2229					80% gamma percentile (KM)	1.553					90% gamma percentile (KM)	3.385	
2230					95% gamma percentile (KM)	5.614					99% gamma percentile (KM)	11.65	
2231													
2232	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
2233					Approximate Chi Square Value (14.21, $\alpha$ )	6.717					Adjusted Chi Square Value (14.21, $\beta$ )	6.442	
2234					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	2.372					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	2.473	
2235													
2236	<b>Lognormal GOF Test on Detected Observations Only</b>												
2237					Shapiro Wilk Test Statistic	0.948					<b>Shapiro Wilk GOF Test</b>		
2238					5% Shapiro Wilk Critical Value	0.927					Detected Data appear Lognormal at 5% Significance Level		
2239					Lilliefors Test Statistic	0.111					<b>Lilliefors GOF Test</b>		
2240					5% Lilliefors Critical Value	0.159					Detected Data appear Lognormal at 5% Significance Level		
2241	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
2242													
2243	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
2244					Mean in Original Scale	1.12					Mean in Log Scale	-0.567	
2245					SD in Original Scale	2.417					SD in Log Scale	1.014	
2246					95% t UCL (assumes normality of ROS data)	1.844					95% Percentile Bootstrap UCL	1.93	
2247					95% BCA Bootstrap UCL	2.365					95% Bootstrap t UCL	3.704	
2248					95% H-UCL (Log ROS)	1.483							
2249													
2250	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
2251					KM Mean (logged)	-0.57					KM Geo Mean	0.565	
2252					KM SD (logged)	1.009					95% Critical H Value (KM-Log)	2.442	
2253					KM Standard Error of Mean (logged)	0.183					95% H-UCL (KM -Log)	1.465	
2254					KM SD (logged)	1.009					95% Critical H Value (KM-Log)	2.442	
2255					KM Standard Error of Mean (logged)	0.183							
2256													
2257	<b>DL/2 Statistics</b>												
2258					<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>		
2259					Mean in Original Scale	1.117					Mean in Log Scale	-0.578	
2260					SD in Original Scale	2.418					SD in Log Scale	1.023	
2261					95% t UCL (Assumes normality)	1.842					95% H-Stat UCL	1.488	
2262	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
2263													
2264	<b>Nonparametric Distribution Free UCL Statistics</b>												
2265	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>												
2266													
2267	<b>Suggested UCL to Use</b>												
2268					KM H-UCL	1.465							
2269													
2270	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2271	Recommendations are based upon data size, data distribution, and skewness.												
2272	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2273	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
2274													
2275	<b>Benzo(a)pyrene</b>												
2276													
2277	<b>General Statistics</b>												
2278					Total Number of Observations	38					Number of Distinct Observations	33	
2279					Number of Detects	37					Number of Non-Detects	1	

	A	B	C	D	E	F	G	H	I	J	K	L
2280	Number of Distinct Detects					32	Number of Distinct Non-Detects					1
2281	Minimum Detect					0.053	Minimum Non-Detect					0.51
2282	Maximum Detect					31	Maximum Non-Detect					0.51
2283	Variance Detects					25.36	Percent Non-Detects					2.632%
2284	Mean Detects					2.047	SD Detects					5.036
2285	Median Detects					0.76	CV Detects					2.46
2286	Skewness Detects					5.568	Kurtosis Detects					32.59
2287	Mean of Logged Detects					-0.124	SD of Logged Detects					1.158
2288												
2289	<b>Normal GOF Test on Detects Only</b>											
2290	Shapiro Wilk Test Statistic					0.339	<b>Shapiro Wilk GOF Test</b>					
2291	5% Shapiro Wilk Critical Value					0.936	Detected Data Not Normal at 5% Significance Level					
2292	Lilliefors Test Statistic					0.346	<b>Lilliefors GOF Test</b>					
2293	5% Lilliefors Critical Value					0.144	Detected Data Not Normal at 5% Significance Level					
2294	<b>Detected Data Not Normal at 5% Significance Level</b>											
2295												
2296	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2297	KM Mean					2	KM Standard Error of Mean					0.808
2298	KM SD					4.91	95% KM (BCA) UCL					3.658
2299	95% KM (t) UCL					3.362	95% KM (Percentile Bootstrap) UCL					3.546
2300	95% KM (z) UCL					3.328	95% KM Bootstrap t UCL					6.929
2301	90% KM Chebyshev UCL					4.422	95% KM Chebyshev UCL					5.52
2302	97.5% KM Chebyshev UCL					7.043	99% KM Chebyshev UCL					10.03
2303												
2304	<b>Gamma GOF Tests on Detected Observations Only</b>											
2305	A-D Test Statistic					2.2	<b>Anderson-Darling GOF Test</b>					
2306	5% A-D Critical Value					0.792	Detected Data Not Gamma Distributed at 5% Significance Level					
2307	K-S Test Statistic					0.23	<b>Kolmogorov-Smirnov GOF</b>					
2308	5% K-S Critical Value					0.151	Detected Data Not Gamma Distributed at 5% Significance Level					
2309	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2310												
2311	<b>Gamma Statistics on Detected Data Only</b>											
2312	k hat (MLE)					0.716	k star (bias corrected MLE)					0.676
2313	Theta hat (MLE)					2.857	Theta star (bias corrected MLE)					3.027
2314	nu hat (MLE)					53.02	nu star (bias corrected)					50.05
2315	Mean (detects)					2.047						
2316												
2317	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2318	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2319	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2320	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2321	This is especially true when the sample size is small.											
2322	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2323	Minimum					0.01	Mean					1.994
2324	Maximum					31	Median					0.745
2325	SD					4.979	CV					2.497
2326	k hat (MLE)					0.654	k star (bias corrected MLE)					0.62
2327	Theta hat (MLE)					3.046	Theta star (bias corrected MLE)					3.213
2328	nu hat (MLE)					49.74	nu star (bias corrected)					47.15
2329	Adjusted Level of Significance ( $\beta$ )					0.0434						
2330	Approximate Chi Square Value (47.15, $\alpha$ )					32.39	Adjusted Chi Square Value (47.15, $\beta$ )					31.88
2331	95% Gamma Approximate UCL (use when $n \geq 50$ )					2.902	95% Gamma Adjusted UCL (use when $n < 50$ )					2.948
2332												

	A	B	C	D	E	F	G	H	I	J	K	L
2333	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2334	Mean (KM)				2	SD (KM)				4.91		
2335	Variance (KM)				24.11	SE of Mean (KM)				0.808		
2336	k hat (KM)				0.166	k star (KM)				0.17		
2337	nu hat (KM)				12.61	nu star (KM)				12.94		
2338	theta hat (KM)				12.06	theta star (KM)				11.74		
2339	80% gamma percentile (KM)				2.393	90% gamma percentile (KM)				6.01		
2340	95% gamma percentile (KM)				10.72	99% gamma percentile (KM)				24.04		
2341												
2342	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2343	Approximate Chi Square Value (12.94, $\alpha$ )				5.855	Adjusted Chi Square Value (12.94, $\beta$ )				5.657		
2344	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				4.421	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				4.575		
2345												
2346	<b>Lognormal GOF Test on Detected Observations Only</b>											
2347	Shapiro Wilk Test Statistic				0.971	<b>Shapiro Wilk GOF Test</b>						
2348	5% Shapiro Wilk Critical Value				0.936	Detected Data appear Lognormal at 5% Significance Level						
2349	Lilliefors Test Statistic				0.115	<b>Lilliefors GOF Test</b>						
2350	5% Lilliefors Critical Value				0.144	Detected Data appear Lognormal at 5% Significance Level						
2351	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2352												
2353	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2354	Mean in Original Scale				1.999	Mean in Log Scale				-0.161		
2355	SD in Original Scale				4.976	SD in Log Scale				1.165		
2356	95% t UCL (assumes normality of ROS data)				3.361	95% Percentile Bootstrap UCL				3.55		
2357	95% BCA Bootstrap UCL				4.497	95% Bootstrap t UCL				6.991		
2358	95% H-UCL (Log ROS)				2.755							
2359												
2360	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2361	KM Mean (logged)				-0.161	KM Geo Mean				0.851		
2362	KM SD (logged)				1.153	95% Critical H Value (KM-Log)				2.577		
2363	KM Standard Error of Mean (logged)				0.19	95% H-UCL (KM -Log)				2.699		
2364	KM SD (logged)				1.153	95% Critical H Value (KM-Log)				2.577		
2365	KM Standard Error of Mean (logged)				0.19							
2366												
2367	<b>DL/2 Statistics</b>											
2368	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2369	Mean in Original Scale				2	Mean in Log Scale				-0.157		
2370	SD in Original Scale				4.976	SD in Log Scale				1.16		
2371	95% t UCL (Assumes normality)				3.362	95% H-Stat UCL				2.744		
2372	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2373												
2374	<b>Nonparametric Distribution Free UCL Statistics</b>											
2375	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>											
2376												
2377	<b>Suggested UCL to Use</b>											
2378	KM H-UCL				2.699							
2379												
2380	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2381	Recommendations are based upon data size, data distribution, and skewness.											
2382	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2383	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2384												
2385	<b>Chrysene</b>											



	A	B	C	D	E	F	G	H	I	J	K	L
2386												
2387	<b>General Statistics</b>											
2388	Total Number of Observations				38		Number of Distinct Observations				32	
2389	Number of Detects				37		Number of Non-Detects				1	
2390	Number of Distinct Detects				31		Number of Distinct Non-Detects				1	
2391	Minimum Detect				0.062		Minimum Non-Detect				0.51	
2392	Maximum Detect				34		Maximum Non-Detect				0.51	
2393	Variance Detects				30.36		Percent Non-Detects				2.632%	
2394	Mean Detects				2.212		SD Detects				5.51	
2395	Median Detects				0.77		CV Detects				2.492	
2396	Skewness Detects				5.624		Kurtosis Detects				33.09	
2397	Mean of Logged Detects				-0.0377		SD of Logged Detects				1.141	
2398												
2399	<b>Normal GOF Test on Detects Only</b>											
2400	Shapiro Wilk Test Statistic				0.332		<b>Shapiro Wilk GOF Test</b>					
2401	5% Shapiro Wilk Critical Value				0.936		Detected Data Not Normal at 5% Significance Level					
2402	Lilliefors Test Statistic				0.348		<b>Lilliefors GOF Test</b>					
2403	5% Lilliefors Critical Value				0.144		Detected Data Not Normal at 5% Significance Level					
2404	<b>Detected Data Not Normal at 5% Significance Level</b>											
2405												
2406	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2407	KM Mean				2.161		KM Standard Error of Mean				0.884	
2408	KM SD				5.372		95% KM (BCA) UCL				3.923	
2409	95% KM (t) UCL				3.652		95% KM (Percentile Bootstrap) UCL				3.853	
2410	95% KM (z) UCL				3.614		95% KM Bootstrap t UCL				7.622	
2411	90% KM Chebyshev UCL				4.812		95% KM Chebyshev UCL				6.012	
2412	97.5% KM Chebyshev UCL				7.679		99% KM Chebyshev UCL				10.95	
2413												
2414	<b>Gamma GOF Tests on Detected Observations Only</b>											
2415	A-D Test Statistic				2.254		<b>Anderson-Darling GOF Test</b>					
2416	5% A-D Critical Value				0.791		Detected Data Not Gamma Distributed at 5% Significance Level					
2417	K-S Test Statistic				0.203		<b>Kolmogorov-Smirnov GOF</b>					
2418	5% K-S Critical Value				0.151		Detected Data Not Gamma Distributed at 5% Significance Level					
2419	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2420												
2421	<b>Gamma Statistics on Detected Data Only</b>											
2422	k hat (MLE)				0.723		k star (bias corrected MLE)				0.683	
2423	Theta hat (MLE)				3.057		Theta star (bias corrected MLE)				3.239	
2424	nu hat (MLE)				53.54		nu star (bias corrected)				50.53	
2425	Mean (detects)				2.212							
2426												
2427	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2428	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2429	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2430	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2431	This is especially true when the sample size is small.											
2432	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2433	Minimum				0.01		Mean				2.154	
2434	Maximum				34		Median				0.765	
2435	SD				5.447		CV				2.529	
2436	k hat (MLE)				0.659		k star (bias corrected MLE)				0.624	
2437	Theta hat (MLE)				3.269		Theta star (bias corrected MLE)				3.449	
2438	nu hat (MLE)				50.07		nu star (bias corrected)				47.45	

	A	B	C	D	E	F	G	H	I	J	K	L
2439	Adjusted Level of Significance ( $\beta$ )					0.0434						
2440	Approximate Chi Square Value (47.45, $\alpha$ )					32.64	Adjusted Chi Square Value (47.45, $\beta$ )					32.13
2441	95% Gamma Approximate UCL (use when $n \geq 50$ )					3.131	95% Gamma Adjusted UCL (use when $n < 50$ )					3.18
2442												
2443	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2444	Mean (KM)					2.161	SD (KM)					5.372
2445	Variance (KM)					28.86	SE of Mean (KM)					0.884
2446	k hat (KM)					0.162	k star (KM)					0.167
2447	nu hat (KM)					12.3	nu star (KM)					12.66
2448	theta hat (KM)					13.35	theta star (KM)					12.97
2449	80% gamma percentile (KM)					2.548	90% gamma percentile (KM)					6.484
2450	95% gamma percentile (KM)					11.64	99% gamma percentile (KM)					26.29
2451												
2452	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2453	Approximate Chi Square Value (12.66, $\alpha$ )					5.666	Adjusted Chi Square Value (12.66, $\beta$ )					5.472
2454	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					4.83	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					5.001
2455												
2456	<b>Lognormal GOF Test on Detected Observations Only</b>											
2457	Shapiro Wilk Test Statistic					0.968	<b>Shapiro Wilk GOF Test</b>					
2458	5% Shapiro Wilk Critical Value					0.936	Detected Data appear Lognormal at 5% Significance Level					
2459	Lilliefors Test Statistic					0.132	<b>Lilliefors GOF Test</b>					
2460	5% Lilliefors Critical Value					0.144	Detected Data appear Lognormal at 5% Significance Level					
2461	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2462												
2463	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2464	Mean in Original Scale					2.16	Mean in Log Scale					-0.0735
2465	SD in Original Scale					5.445	SD in Log Scale					1.147
2466	95% t UCL (assumes normality of ROS data)					3.65	95% Percentile Bootstrap UCL					3.812
2467	95% BCA Bootstrap UCL					4.975	95% Bootstrap t UCL					7.522
2468	95% H-UCL (Log ROS)					2.911						
2469												
2470	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2471	KM Mean (logged)					-0.0729	KM Geo Mean					0.93
2472	KM SD (logged)					1.135	95% Critical H Value (KM-Log)					2.555
2473	KM Standard Error of Mean (logged)					0.187	95% H-UCL (KM -Log)					2.852
2474	KM SD (logged)					1.135	95% Critical H Value (KM-Log)					2.555
2475	KM Standard Error of Mean (logged)					0.187						
2476												
2477	<b>DL/2 Statistics</b>											
2478	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
2479	Mean in Original Scale					2.16	Mean in Log Scale					-0.0727
2480	SD in Original Scale					5.445	SD in Log Scale					1.146
2481	95% t UCL (Assumes normality)					3.65	95% H-Stat UCL					2.908
2482	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2483												
2484	<b>Nonparametric Distribution Free UCL Statistics</b>											
2485	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>											
2486												
2487	<b>Suggested UCL to Use</b>											
2488	KM H-UCL					2.852						
2489												
2490	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2491	Recommendations are based upon data size, data distribution, and skewness.											

	A	B	C	D	E	F	G	H	I	J	K	L
2492	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2493	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2494												
2495	<b>Dibenz(a,h)anthracene</b>											
2496												
2497	<b>General Statistics</b>											
2498	Total Number of Observations				21		Number of Distinct Observations				18	
2499	Number of Detects				19		Number of Non-Detects				2	
2500	Number of Distinct Detects				16		Number of Distinct Non-Detects				2	
2501	Minimum Detect				0.085		Minimum Non-Detect				0.44	
2502	Maximum Detect				4.8		Maximum Non-Detect				0.51	
2503	Variance Detects				1.109		Percent Non-Detects				9.524%	
2504	Mean Detects				0.567		SD Detects				1.053	
2505	Median Detects				0.22		CV Detects				1.857	
2506	Skewness Detects				3.987		Kurtosis Detects				16.69	
2507	Mean of Logged Detects				-1.224		SD of Logged Detects				1.011	
2508												
2509	<b>Normal GOF Test on Detects Only</b>											
2510	Shapiro Wilk Test Statistic				0.433		<b>Shapiro Wilk GOF Test</b>					
2511	5% Shapiro Wilk Critical Value				0.901		Detected Data Not Normal at 5% Significance Level					
2512	Lilliefors Test Statistic				0.386		<b>Lilliefors GOF Test</b>					
2513	5% Lilliefors Critical Value				0.197		Detected Data Not Normal at 5% Significance Level					
2514	<b>Detected Data Not Normal at 5% Significance Level</b>											
2515												
2516	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2517	KM Mean				0.53		KM Standard Error of Mean				0.22	
2518	KM SD				0.982		95% KM (BCA) UCL				0.975	
2519	95% KM (t) UCL				0.91		95% KM (Percentile Bootstrap) UCL				0.94	
2520	95% KM (z) UCL				0.893		95% KM Bootstrap t UCL				1.825	
2521	90% KM Chebyshev UCL				1.191		95% KM Chebyshev UCL				1.491	
2522	97.5% KM Chebyshev UCL				1.906		99% KM Chebyshev UCL				2.722	
2523												
2524	<b>Gamma GOF Tests on Detected Observations Only</b>											
2525	A-D Test Statistic				1.448		<b>Anderson-Darling GOF Test</b>					
2526	5% A-D Critical Value				0.773		Detected Data Not Gamma Distributed at 5% Significance Level					
2527	K-S Test Statistic				0.222		<b>Kolmogorov-Smirnov GOF</b>					
2528	5% K-S Critical Value				0.205		Detected Data Not Gamma Distributed at 5% Significance Level					
2529	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2530												
2531	<b>Gamma Statistics on Detected Data Only</b>											
2532	k hat (MLE)				0.89		k star (bias corrected MLE)				0.785	
2533	Theta hat (MLE)				0.637		Theta star (bias corrected MLE)				0.723	
2534	nu hat (MLE)				33.83		nu star (bias corrected)				29.82	
2535	Mean (detects)				0.567							
2536												
2537	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2538	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2539	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2540	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2541	This is especially true when the sample size is small.											
2542	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2543	Minimum				0.018		Mean				0.517	
2544	Maximum				4.8		Median				0.22	

	A	B	C	D	E	F	G	H	I	J	K	L	
2545					SD	1.012					CV	1.959	
2546					k hat (MLE)	0.765					k star (bias corrected MLE)	0.688	
2547					Theta hat (MLE)	0.675					Theta star (bias corrected MLE)	0.751	
2548					nu hat (MLE)	32.15					nu star (bias corrected)	28.89	
2549					Adjusted Level of Significance ( $\beta$ )	0.0383							
2550					Approximate Chi Square Value (28.89, $\alpha$ )	17.62					Adjusted Chi Square Value (28.89, $\beta$ )	16.95	
2551					95% Gamma Approximate UCL (use when $n \geq 50$ )	0.847					95% Gamma Adjusted UCL (use when $n < 50$ )	0.881	
2552													
2553					<b>Estimates of Gamma Parameters using KM Estimates</b>								
2554					Mean (KM)	0.53					SD (KM)	0.982	
2555					Variance (KM)	0.965					SE of Mean (KM)	0.22	
2556					k hat (KM)	0.292					k star (KM)	0.282	
2557					nu hat (KM)	12.25					nu star (KM)	11.84	
2558					theta hat (KM)	1.818					theta star (KM)	1.882	
2559					80% gamma percentile (KM)	0.8					90% gamma percentile (KM)	1.576	
2560					95% gamma percentile (KM)	2.475					99% gamma percentile (KM)	4.832	
2561													
2562					<b>Gamma Kaplan-Meier (KM) Statistics</b>								
2563					Approximate Chi Square Value (11.84, $\alpha$ )	5.119					Adjusted Chi Square Value (11.84, $\beta$ )	4.782	
2564					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	1.226					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	1.313	
2565													
2566					<b>Lognormal GOF Test on Detected Observations Only</b>								
2567					Shapiro Wilk Test Statistic	0.895					<b>Shapiro Wilk GOF Test</b>		
2568					5% Shapiro Wilk Critical Value	0.901					Detected Data Not Lognormal at 5% Significance Level		
2569					Lilliefors Test Statistic	0.147					<b>Lilliefors GOF Test</b>		
2570					5% Lilliefors Critical Value	0.197					Detected Data appear Lognormal at 5% Significance Level		
2571					<b>Detected Data appear Approximate Lognormal at 5% Significance Level</b>								
2572													
2573					<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>								
2574					Mean in Original Scale	0.531					Mean in Log Scale	-1.269	
2575					SD in Original Scale	1.006					SD in Log Scale	0.969	
2576					95% t UCL (assumes normality of ROS data)	0.909					95% Percentile Bootstrap UCL	0.953	
2577					95% BCA Bootstrap UCL	1.172					95% Bootstrap t UCL	1.859	
2578					95% H-UCL (Log ROS)	0.777							
2579													
2580					<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>								
2581					KM Mean (logged)	-1.281					KM Geo Mean	0.278	
2582					KM SD (logged)	0.961					95% Critical H Value (KM-Log)	2.512	
2583					KM Standard Error of Mean (logged)	0.218					95% H-UCL (KM -Log)	0.757	
2584					KM SD (logged)	0.961					95% Critical H Value (KM-Log)	2.512	
2585					KM Standard Error of Mean (logged)	0.218							
2586													
2587					<b>DL/2 Statistics</b>								
2588					<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>		
2589					Mean in Original Scale	0.536					Mean in Log Scale	-1.245	
2590					SD in Original Scale	1.004					SD in Log Scale	0.961	
2591					95% t UCL (Assumes normality)	0.914					95% H-Stat UCL	0.784	
2592					<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>								
2593													
2594					<b>Nonparametric Distribution Free UCL Statistics</b>								
2595					<b>Detected Data appear Approximate Lognormal Distributed at 5% Significance Level</b>								
2596													
2597					<b>Suggested UCL to Use</b>								

	A	B	C	D	E	F	G	H	I	J	K	L		
2598	95% KM (Chebyshev) UCL					1.491								
2599														
2600	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.													
2601	Recommendations are based upon data size, data distribution, and skewness.													
2602	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).													
2603	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.													
2604														
2605	<b>Indeno(1,2,3-cd)pyrene</b>													
2606														
2607	<b>General Statistics</b>													
2608	Total Number of Observations				33	Number of Distinct Observations				29				
2609	Number of Detects				32	Number of Non-Detects				1				
2610	Number of Distinct Detects				29	Number of Distinct Non-Detects				1				
2611	Minimum Detect				0.041	Minimum Non-Detect				0.51				
2612	Maximum Detect				18	Maximum Non-Detect				0.51				
2613	Variance Detects				9.859	Percent Non-Detects				3.03%				
2614	Mean Detects				1.479	SD Detects				3.14				
2615	Median Detects				0.565	CV Detects				2.123				
2616	Skewness Detects				4.997	Kurtosis Detects				26.72				
2617	Mean of Logged Detects				-0.354	SD of Logged Detects				1.111				
2618														
2619	<b>Normal GOF Test on Detects Only</b>													
2620	Shapiro Wilk Test Statistic				0.39	<b>Shapiro Wilk GOF Test</b>								
2621	5% Shapiro Wilk Critical Value				0.93	Detected Data Not Normal at 5% Significance Level								
2622	Lilliefors Test Statistic				0.329	<b>Lilliefors GOF Test</b>								
2623	5% Lilliefors Critical Value				0.154	Detected Data Not Normal at 5% Significance Level								
2624	<b>Detected Data Not Normal at 5% Significance Level</b>													
2625														
2626	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>													
2627	KM Mean				1.444	KM Standard Error of Mean				0.539				
2628	KM SD				3.05	95% KM (BCA) UCL				2.571				
2629	95% KM (t) UCL				2.357	95% KM (Percentile Bootstrap) UCL				2.434				
2630	95% KM (z) UCL				2.331	95% KM Bootstrap t UCL				4.295				
2631	90% KM Chebyshev UCL				3.062	95% KM Chebyshev UCL				3.795				
2632	97.5% KM Chebyshev UCL				4.812	99% KM Chebyshev UCL				6.811				
2633														
2634	<b>Gamma GOF Tests on Detected Observations Only</b>													
2635	A-D Test Statistic				1.94	<b>Anderson-Darling GOF Test</b>								
2636	5% A-D Critical Value				0.785	Detected Data Not Gamma Distributed at 5% Significance Level								
2637	K-S Test Statistic				0.228	<b>Kolmogorov-Smirnov GOF</b>								
2638	5% K-S Critical Value				0.161	Detected Data Not Gamma Distributed at 5% Significance Level								
2639	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>													
2640														
2641	<b>Gamma Statistics on Detected Data Only</b>													
2642	k hat (MLE)				0.796	k star (bias corrected MLE)				0.743				
2643	Theta hat (MLE)				1.857	Theta star (bias corrected MLE)				1.991				
2644	nu hat (MLE)				50.97	nu star (bias corrected)				47.53				
2645	Mean (detects)				1.479									
2646														
2647	<b>Gamma ROS Statistics using Imputed Non-Detects</b>													
2648	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs													
2649	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)													
2650	For such situations, GROS method may yield incorrect values of UCLs and BTVs													

	A	B	C	D	E	F	G	H	I	J	K	L
2651	This is especially true when the sample size is small.											
2652	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2653		Minimum	0.01							Mean	1.434	
2654		Maximum	18							Median	0.52	
2655		SD	3.101							CV	2.162	
2656		k hat (MLE)	0.714							k star (bias corrected MLE)	0.669	
2657		Theta hat (MLE)	2.008							Theta star (bias corrected MLE)	2.142	
2658		nu hat (MLE)	47.14							nu star (bias corrected)	44.18	
2659		Adjusted Level of Significance ( $\beta$ )	0.0419									
2660		Approximate Chi Square Value (44.18, $\alpha$ )	29.94							Adjusted Chi Square Value (44.18, $\beta$ )	29.33	
2661		95% Gamma Approximate UCL (use when $n \geq 50$ )	2.117							95% Gamma Adjusted UCL (use when $n < 50$ )	2.16	
2662												
2663	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2664		Mean (KM)	1.444							SD (KM)	3.05	
2665		Variance (KM)	9.301							SE of Mean (KM)	0.539	
2666		k hat (KM)	0.224							k star (KM)	0.224	
2667		nu hat (KM)	14.79							nu star (KM)	14.78	
2668		theta hat (KM)	6.442							theta star (KM)	6.447	
2669		80% gamma percentile (KM)	2.008							90% gamma percentile (KM)	4.359	
2670		95% gamma percentile (KM)	7.215							99% gamma percentile (KM)	14.94	
2671												
2672	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2673		Approximate Chi Square Value (14.78, $\alpha$ )	7.108							Adjusted Chi Square Value (14.78, $\beta$ )	6.834	
2674		95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	3.002							95% Gamma Adjusted KM-UCL (use when $n < 50$ )	3.122	
2675												
2676	<b>Lognormal GOF Test on Detected Observations Only</b>											
2677		Shapiro Wilk Test Statistic	0.956							<b>Shapiro Wilk GOF Test</b>		
2678		5% Shapiro Wilk Critical Value	0.93							Detected Data appear Lognormal at 5% Significance Level		
2679		Lilliefors Test Statistic	0.124							<b>Lilliefors GOF Test</b>		
2680		5% Lilliefors Critical Value	0.154							Detected Data appear Lognormal at 5% Significance Level		
2681	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2682												
2683	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2684		Mean in Original Scale	1.442							Mean in Log Scale	-0.383	
2685		SD in Original Scale	3.097							SD in Log Scale	1.105	
2686		95% t UCL (assumes normality of ROS data)	2.356							95% Percentile Bootstrap UCL	2.496	
2687		95% BCA Bootstrap UCL	3.097							95% Bootstrap t UCL	4.437	
2688		95% H-UCL (Log ROS)	2.075									
2689												
2690	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2691		KM Mean (logged)	-0.382							KM Geo Mean	0.682	
2692		KM SD (logged)	1.094							95% Critical H Value (KM-Log)	2.553	
2693		KM Standard Error of Mean (logged)	0.195							95% H-UCL (KM -Log)	2.033	
2694		KM SD (logged)	1.094							95% Critical H Value (KM-Log)	2.553	
2695		KM Standard Error of Mean (logged)	0.195									
2696												
2697	<b>DL/2 Statistics</b>											
2698	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
2699		Mean in Original Scale	1.442							Mean in Log Scale	-0.385	
2700		SD in Original Scale	3.098							SD in Log Scale	1.107	
2701		95% t UCL (Assumes normality)	2.355							95% H-Stat UCL	2.078	
2702	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2703												

	A	B	C	D	E	F	G	H	I	J	K	L
2704	<b>Nonparametric Distribution Free UCL Statistics</b>											
2705	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>											
2706												
2707	<b>Suggested UCL to Use</b>											
2708					KM H-UCL	2.033						
2709												
2710	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2711	Recommendations are based upon data size, data distribution, and skewness.											
2712	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2713	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2714												
2715	<b>Phenanthrene</b>											
2716												
2717	<b>General Statistics</b>											
2718	Total Number of Observations				38	Number of Distinct Observations				35		
2719	Number of Detects				37	Number of Non-Detects				1		
2720	Number of Distinct Detects				34	Number of Distinct Non-Detects				1		
2721	Minimum Detect				0.07	Minimum Non-Detect				0.51		
2722	Maximum Detect				110	Maximum Non-Detect				0.51		
2723	Variance Detects				321.6	Percent Non-Detects				2.632%		
2724	Mean Detects				4.855	SD Detects				17.93		
2725	Median Detects				0.9	CV Detects				3.694		
2726	Skewness Detects				5.91	Kurtosis Detects				35.52		
2727	Mean of Logged Detects				0.179	SD of Logged Detects				1.34		
2728												
2729	<b>Normal GOF Test on Detects Only</b>											
2730	Shapiro Wilk Test Statistic				0.253	<b>Shapiro Wilk GOF Test</b>						
2731	5% Shapiro Wilk Critical Value				0.936	Detected Data Not Normal at 5% Significance Level						
2732	Lilliefors Test Statistic				0.395	<b>Lilliefors GOF Test</b>						
2733	5% Lilliefors Critical Value				0.144	Detected Data Not Normal at 5% Significance Level						
2734	<b>Detected Data Not Normal at 5% Significance Level</b>											
2735												
2736	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
2737	KM Mean				4.735	KM Standard Error of Mean				2.873		
2738	KM SD				17.47	95% KM (BCA) UCL				10.6		
2739	95% KM (t) UCL				9.582	95% KM (Percentile Bootstrap) UCL				10.44		
2740	95% KM (z) UCL				9.461	95% KM Bootstrap t UCL				37.61		
2741	90% KM Chebyshev UCL				13.35	95% KM Chebyshev UCL				17.26		
2742	97.5% KM Chebyshev UCL				22.68	99% KM Chebyshev UCL				33.32		
2743												
2744	<b>Gamma GOF Tests on Detected Observations Only</b>											
2745	A-D Test Statistic				3.982	<b>Anderson-Darling GOF Test</b>						
2746	5% A-D Critical Value				0.822	Detected Data Not Gamma Distributed at 5% Significance Level						
2747	K-S Test Statistic				0.264	<b>Kolmogorov-Smirnov GOF</b>						
2748	5% K-S Critical Value				0.154	Detected Data Not Gamma Distributed at 5% Significance Level						
2749	<b>Detected Data Not Gamma Distributed at 5% Significance Level</b>											
2750												
2751	<b>Gamma Statistics on Detected Data Only</b>											
2752	k hat (MLE)				0.46	k star (bias corrected MLE)				0.44		
2753	Theta hat (MLE)				10.56	Theta star (bias corrected MLE)				11.03		
2754	nu hat (MLE)				34.01	nu star (bias corrected)				32.58		
2755	Mean (detects)				4.855							
2756												

	A	B	C	D	E	F	G	H	I	J	K	L
2757	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
2758	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2759	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2760	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2761	This is especially true when the sample size is small.											
2762	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2763	Minimum				0.01		Mean				4.727	
2764	Maximum				110		Median				0.885	
2765	SD				17.71		CV				3.746	
2766	k hat (MLE)				0.433		k star (bias corrected MLE)				0.416	
2767	Theta hat (MLE)				10.91		Theta star (bias corrected MLE)				11.35	
2768	nu hat (MLE)				32.92		nu star (bias corrected)				31.65	
2769	Adjusted Level of Significance ( $\beta$ )				0.0434							
2770	Approximate Chi Square Value (31.65, $\alpha$ )				19.8		Adjusted Chi Square Value (31.65, $\beta$ )				19.41	
2771	95% Gamma Approximate UCL (use when $n \geq 50$ )				7.558		95% Gamma Adjusted UCL (use when $n < 50$ )				7.71	
2772												
2773	<b>Estimates of Gamma Parameters using KM Estimates</b>											
2774	Mean (KM)				4.735		SD (KM)				17.47	
2775	Variance (KM)				305.2		SE of Mean (KM)				2.873	
2776	k hat (KM)				0.0735		k star (KM)				0.0852	
2777	nu hat (KM)				5.583		nu star (KM)				6.476	
2778	theta hat (KM)				64.46		theta star (KM)				55.57	
2779	80% gamma percentile (KM)				2.536		90% gamma percentile (KM)				11.66	
2780	95% gamma percentile (KM)				27.59		99% gamma percentile (KM)				81.37	
2781												
2782	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
2783	Approximate Chi Square Value (6.48, $\alpha$ )				1.888		Adjusted Chi Square Value (6.48, $\beta$ )				1.787	
2784	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				16.24		95% Gamma Adjusted KM-UCL (use when $n < 50$ )				17.16	
2785	95% Gamma Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ )											
2786												
2787	<b>Lognormal GOF Test on Detected Observations Only</b>											
2788	Shapiro Wilk Test Statistic				0.948		<b>Shapiro Wilk GOF Test</b>					
2789	5% Shapiro Wilk Critical Value				0.936		Detected Data appear Lognormal at 5% Significance Level					
2790	Lilliefors Test Statistic				0.136		<b>Lilliefors GOF Test</b>					
2791	5% Lilliefors Critical Value				0.144		Detected Data appear Lognormal at 5% Significance Level					
2792	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
2793												
2794	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
2795	Mean in Original Scale				4.734		Mean in Log Scale				0.138	
2796	SD in Original Scale				17.71		SD in Log Scale				1.346	
2797	95% t UCL (assumes normality of ROS data)				9.579		95% Percentile Bootstrap UCL				10.41	
2798	95% BCA Bootstrap UCL				13.48		95% Bootstrap t UCL				37.07	
2799	95% H-UCL (Log ROS)				5.306							
2800												
2801	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
2802	KM Mean (logged)				0.14		KM Geo Mean				1.151	
2803	KM SD (logged)				1.329		95% Critical H Value (KM-Log)				2.799	
2804	KM Standard Error of Mean (logged)				0.219		95% H-UCL (KM -Log)				5.126	
2805	KM SD (logged)				1.329		95% Critical H Value (KM-Log)				2.799	
2806	KM Standard Error of Mean (logged)				0.219							
2807												
2808	<b>DL/2 Statistics</b>											
2809	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					



	A	B	C	D	E	F	G	H	I	J	K	L
2810	Mean in Original Scale					4.734	Mean in Log Scale					0.139
2811	SD in Original Scale					17.71	SD in Log Scale					1.345
2812	95% t UCL (Assumes normality)					9.579	95% H-Stat UCL					5.3
2813	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
2814												
2815	<b>Nonparametric Distribution Free UCL Statistics</b>											
2816	<b>Detected Data appear Lognormal Distributed at 5% Significance Level</b>											
2817												
2818	<b>Suggested UCL to Use</b>											
2819	KM H-UCL					5.126						
2820												
2821	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2822	Recommendations are based upon data size, data distribution, and skewness.											
2823	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2824	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2825												

***Appendix B-5 Wilkeson Pointe - Undeveloped Portion AOC***

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on U <sub>m</sub> /U <sub>c</sub> ) unitless	0.194	0.194
n (total soil porosity) L <sub>poro</sub> /L <sub>soil</sub>	0.43396	0.43396
p <sub>b</sub> (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
p <sub>b</sub> (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
p <sub>c</sub> (soil particle density) g/cm <sup>3</sup>	2.65	2.65
Q/C <sub>wind</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
Q/C <sub>soil</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
Q/C <sub>soil</sub> (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
A <sub>c</sub> (PEF acres)	0.5	0.5
A <sub>c</sub> (VF acres)	0.5	0.5
A <sub>c</sub> (VF mass-limit acres)	0.5	0.5
AF <sub>so</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
AF <sub>so</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.2	0.2
AF <sub>so</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
AF <sub>so</sub> (skin adherence factor) mg/cm <sup>2</sup>	0.07	0.07
AF <sub>so</sub> (skin adherence factor - adult) mg/cm <sup>2</sup>	0.07	0.07
AF <sub>so</sub> (skin adherence factor - child) mg/cm <sup>2</sup>	0.2	0.2

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
AT <sub>rec</sub> (averaging time)	365	365
BW <sub>n,r</sub> (body weight) kg	15	15
BW <sub>γ,r</sub> (body weight) kg	15	15
BW <sub>6-16</sub> (body weight) kg	80	80
BW <sub>16-20</sub> (body weight) kg	80	80
BW <sub>rec,a</sub> (body weight - adult) kg	80	80
BW <sub>rec,c</sub> (body weight - child) kg	15	15
DFS <sub>rec,arti</sub> (age-adjusted soil dermal factor) mg/kg	.	27767.6
DFS <sub>M,rec,arti</sub> (mutagenic age-adjusted soil dermal factor) mg/kg	.	115018.4
ED <sub>rec</sub> (exposure duration - recreator) years	26	26
ED <sub>n,r</sub> (exposure duration) year	2	2
ED <sub>γ,r</sub> (exposure duration) year	4	4
ED <sub>6-16</sub> (exposure duration) year	10	10
ED <sub>16-20</sub> (exposure duration) year	10	10
ED <sub>rec,c</sub> (exposure duration - child) years	6	6
EF <sub>rec</sub> (exposure frequency) days/year	.	94
EF <sub>n,r</sub> (exposure frequency) days/year	.	94
EF <sub>γ,r</sub> (exposure frequency) days/year	.	94
EF <sub>6-16</sub> (exposure frequency) days/year	.	94
EF <sub>16-20</sub> (exposure frequency) days/year	.	94
EF <sub>rec,a</sub> (exposure frequency - adult) days/year	.	94
EF <sub>rec,c</sub> (exposure frequency - child) days/year	.	94
ET <sub>rec</sub> (exposure time - recreator) hours/day	.	3
ET <sub>n,r</sub> (exposure time) hours/day	.	3
ET <sub>γ,r</sub> (exposure time) hours/day	.	3
ET <sub>6-16</sub> (exposure time) hours/day	.	3
ET <sub>16-20</sub> (exposure time) hours/day	.	3
ET <sub>rec,a</sub> (adult exposure time) hours/day	.	3
ET <sub>rec,c</sub> (child exposure time) hours/day	.	3
THQ (target hazard quotient) unitless	0.1	0.1

# Site-specific Recreator Equation Inputs for Soil

\* Inputted values different from Recreator defaults are highlighted.

Variable	Recreator Soil Default Value	Form-input Value
IFS <sub>recre-adi</sub> (age-adjusted soil ingestion factor) mg/kg	.	9870
IFSM <sub>recre-adi</sub> (mutagenic age-adjusted soil ingestion factor) mg/kg	.	44806.667
IRS <sub>n,s</sub> (soil intake rate) mg/day	200	200
IRS <sub>γ,s</sub> (soil intake rate) mg/day	200	200
IRS <sub>κ-1,s</sub> (soil intake rate) mg/day	100	100
IRS <sub>1κ-20</sub> (soil intake rate) mg/day	100	100
IRS <sub>recre-a</sub> (soil intake rate - adult) mg/day	100	100
IRS <sub>recre-r</sub> (soil intake rate - child) mg/day	200	200
LT (lifetime - recreator) years	70	70
SA <sub>n,s</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>γ,s</sub> (skin surface area) cm <sup>2</sup> /day	2373	2373
SA <sub>κ-1,s</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>1κ-20</sub> (skin surface area) cm <sup>2</sup> /day	6032	6032
SA <sub>recre-a</sub> (skin surface area - adult) cm <sup>2</sup> /day	6032	6032
SA <sub>recre-r</sub> (skin surface area - child) cm <sup>2</sup> /day	2373	2373
TR (target risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>soil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>soil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

## Site-specific

### Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-
Isopropanol	67-63-0	No	Yes	Organics	-		-		2.00E+00	P	2.00E-01
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-

## Site-specific

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> \ (cm <sup>3</sup> /g)	K <sub>d</sub> \ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>*</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref
P	1	-	1	-	-	-	1.50E+03	-	-		2792.15	CRC89
	0.15	-	1	-	-	-	4.50E+01	-	-		1908.15	PHYSPROP
C	1	0.03	0.6	-	-	-	2.90E+01	-	-		888.15	PHYSPROP
H	0.07	-	1	-	-	-	4.10E+01	-	-		1873.15	PHYSPROP
	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP
I	1	0.13	1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP
	1	0.13	1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI
	1	0.13	1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP
	0.013	-	1	-	-	-	1.80E+06	-	-		-	
	1	0.13	1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP
P	1	-	1	-	-	-	4.50E+01	-	-		3200.15	CRC89
	1	-	1	-	-	-	3.50E+01	-	-		2868.15	PHYSPROP
	1	0.13	1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP
	1	0.13	1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP
P	1	-	1	1.09E+05	1.00E+06	1.53E+00	9.18E-03	8.10E-06	3.31E-04	PHYSPROP	355.45	PHYSPROP
I	0.04	-	1	-	-	-	6.50E+01	-	-		2368.15	PHYSPROP
I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP
	1	-	1	-	5.47E+04	-	-	-	-		-	

# Site-specific

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Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia}$ ( $cm^2/s$ )	$D_{iw}$ ( $cm^2/s$ )	$D_A$ ( $cm^2/s$ )	Particulate Emission Factor ( $m^3/kg$ )	Volatilization Factor ( $m^3/kg$ )	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)
6700	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
5070	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
1673	CRC89	INORGANIC	-	-	-	1.36E+09	-	2.88E+00	2.04E+01	2.64E+04
3572.13	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09	4.41E+06	5.70E+00	1.71E+01	2.21E+03
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
-		PAH	4.76E-02	5.56E-06	-	1.36E+09	-	5.70E+01	1.71E+02	6.84E+06
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-
979	YAWS	PAH	2.61E-02	6.75E-06	-	1.36E+09	-	5.70E+02	1.71E+03	6.84E+07
7398.48	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	1.26E+04
5123	YAWS	INORGANIC	-	-	-	1.36E+09	-	-	-	-
-		PAH	4.46E-02	5.21E-06	-	1.36E+09	-	5.70E-01	1.71E+00	6.84E+04
-		PAH	4.48E-02	5.23E-06	-	1.36E+09	-	5.70E+00	1.71E+01	6.84E+05
508.3	CRC89	VOC	1.03E-01	1.12E-05	1.73E-05	1.36E+09	2.77E+04	-	-	-
4325	CRC89	INORGANIC	-	-	-	1.36E+09	-	-	-	-
1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-
-		INORGANIC	-	-	-	1.36E+09	-	-	-	-



# Site-specific

## Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL Child THQ=0.1 (mg/kg)	Dermal SL Child THQ=0.1 (mg/kg)	Inhalation SL Child THQ=0.1 (mg/kg)	Noncarcinogenic SL Child THI=0.1 (mg/kg)	Ingestion SL Adult THQ=0.1 (mg/kg)	Dermal SL Adult THQ=0.1 (mg/kg)	Inhalation SL Adult THQ=0.1 (mg/kg)	Noncarcinogenic SL Adult THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	2.91E+04	-	2.11E+07	2.91E+04	3.11E+05	-	2.11E+07	3.06E+05	2.91E+04 nc
-	1.16E+01	-	-	1.16E+01	1.24E+02	-	-	1.24E+02	1.16E+01 nc
2.52E+00	1.46E+01	1.23E+02	6.33E+04	1.30E+01	1.55E+02	7.36E+02	6.33E+04	1.28E+02	2.52E+00 ca**
-	5.82E+03	-	2.11E+06	5.81E+03	6.21E+04	-	2.11E+06	6.04E+04	5.81E+03 nc
4.27E+00	-	-	-	-	-	-	-	-	4.27E+00 ca
4.28E-01	8.74E+00	2.83E+01	8.45E+03	6.67E+00	9.32E+01	1.70E+02	8.45E+03	5.97E+01	4.28E-01 ca*
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca
4.28E+01	-	-	-	-	-	-	-	-	4.28E+01 ca
-	4.37E+04	-	-	4.37E+04	4.66E+05	-	-	4.66E+05	4.37E+04 nc
4.28E+02	-	-	-	-	-	-	-	-	4.28E+02 ca
1.26E+04	8.74E+00	-	2.53E+04	8.73E+00	9.32E+01	-	2.53E+04	9.28E+01	8.73E+00 nc
-	1.16E+03	-	-	1.16E+03	1.24E+04	-	-	1.24E+04	1.16E+03 nc
4.28E-01	-	-	-	-	-	-	-	-	4.28E-01 ca
4.28E+00	-	-	-	-	-	-	-	-	4.28E+00 ca
-	5.82E+04	-	1.72E+04	1.33E+04	6.21E+05	-	1.72E+04	1.67E+04	1.33E+04 nc
-	6.99E+02	-	2.11E+05	6.97E+02	7.46E+03	-	2.11E+05	7.20E+03	6.97E+02 nc
-	-	-	3.23E+01	3.23E+01	-	-	3.23E+01	3.23E+01	3.23E+01 sat
-	5.82E-01	-	-	5.82E-01	6.21E+00	-	-	6.21E+00	5.82E-01 nc

# Site-specific Recreator Risk for Soil

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06
Isopropanol	-	-	-	-	2.00E+00	P	2.00E-01	P	1	-	1	1.09E+05	1.00E+06	1.53E+00
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04	-
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Recreator Risk for Soil

Chemical	$K_d$ \ (cm <sup>3</sup> /g)	HLC (atm·m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia}$ \ (cm <sup>2</sup> /s)	$D_{iw}$ \ (cm <sup>2</sup> /s)
Aluminum	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-
Antimony (metallic)	4.50E+01	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-	-
Arsenic, Inorganic	2.90E+01	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-	-
Barium	4.10E+01	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-	-
Benz[a]anthracene	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06
Benzo[a]pyrene	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02	5.56E-06
Benzo[b]fluoranthene	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02	5.56E-06
Benzo[k]fluoranthene	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02	5.56E-06
Chromium(III), Insoluble Salts	1.80E+06	-	-		-		-		INORGANIC	-	-
Chrysene	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06
Cobalt	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-
Copper	3.50E+01	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-	-
Dibenz[a,h]anthracene	-	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02	5.21E-06
Indeno[1,2,3-cd]pyrene	-	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-		PAH	4.48E-02	5.23E-06
Isopropanol	9.18E-03	8.10E-06	3.31E-04	PHYSROP	355.45	PHYSROP	508.3	CRC89	VOC	1.03E-01	1.12E-05
Manganese (Non-diet)	6.50E+01	-	-		2368.15	PHYSROP	4325	CRC89	INORGANIC	-	-
Mercury (elemental)	5.20E+01	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06
Thallium Sulfate	-	-	-		-		-		INORGANIC	-	-
<i>*Total Risk/HL</i>	-	-	-		-		-			-	-

# Site-specific Recreator Risk for Soil

Chemical	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ
Aluminum	-	1.36E+09	-	1.49E+04	-	-	-	-	5.12E-02	-
Antimony (metallic)	-	1.36E+09	-	2.30E+00	-	-	-	-	1.97E-02	-
Arsenic, Inorganic	-	1.36E+09	-	1.06E+01	3.69E-06	5.18E-07	4.01E-10	4.20E-06	7.28E-02	8.64E-03
Barium	-	1.36E+09	-	3.58E+02	-	-	-	-	6.15E-03	-
Benz[a]anthracene	6.83E-10	1.36E+09	4.41E+06	2.90E+01	5.09E-06	1.70E-06	1.31E-08	6.80E-06	-	-
Benzo[a]pyrene	-	1.36E+09	-	2.80E+01	4.91E-05	1.64E-05	4.09E-10	6.55E-05	3.20E-01	9.89E-02
Benzo[b]fluoranthene	-	1.36E+09	-	3.00E+01	5.26E-06	1.76E-06	4.38E-11	7.02E-06	-	-
Benzo[k]fluoranthene	-	1.36E+09	-	1.30E+01	2.28E-07	7.61E-08	1.90E-12	3.04E-07	-	-
Chromium(III), Insoluble Salts	-	1.36E+09	-	2.16E+01	-	-	-	-	4.95E-05	-
Chrysene	-	1.36E+09	-	2.70E+01	4.73E-08	1.58E-08	3.95E-13	6.32E-08	-	-
Cobalt	-	1.36E+09	-	9.99E+00	-	-	7.91E-10	7.91E-10	1.14E-01	-
Copper	-	1.36E+09	-	8.02E+01	-	-	-	-	6.88E-03	-
Dibenz[a,h]anthracene	-	1.36E+09	-	4.10E+00	7.19E-06	2.40E-06	5.99E-11	9.59E-06	-	-
Indeno[1,2,3-cd]pyrene	-	1.36E+09	-	1.90E+01	3.33E-06	1.11E-06	2.78E-11	4.44E-06	-	-
Isopropanol	1.73E-05	1.36E+09	2.77E+04	-	-	-	-	-	-	-
Manganese (Non-diet)	-	1.36E+09	-	2.28E+03	-	-	-	-	3.25E-01	-
Mercury (elemental)	1.10E-05	1.36E+09	3.47E+04	8.21E-01	-	-	-	-	-	-
Thallium Sulfate	-	1.36E+09	-	3.50E+00	-	-	-	-	6.01E-01	-
<b>*Total Risk/HI</b>	-	-	-	-	<b>7.39E-05</b>	<b>2.40E-05</b>	<b>1.48E-08</b>	<b>9.79E-05</b>	<b>1.52E+00</b>	<b>1.08E-01</b>

# Site-specific Recreator Risk for Soil

Chemical	Inhalation Child HQ	Noncarcinogenic Child HI	Ingestion Adult HQ	Dermal Adult HQ	Inhalation Adult HQ	Noncarcinogenic Adult HI
Aluminum	7.06E-05	5.13E-02	4.80E-03	-	7.06E-05	4.87E-03
Antimony (metallic)	-	1.97E-02	1.85E-03	-	-	1.85E-03
Arsenic, Inorganic	1.67E-05	8.15E-02	6.82E-03	1.44E-03	1.67E-05	8.28E-03
Barium	1.70E-05	6.16E-03	5.76E-04	-	1.70E-05	5.93E-04
Benz[a]anthracene	-	-	-	-	-	-
Benzo[a]pyrene	3.32E-04	4.20E-01	3.00E-02	1.65E-02	3.32E-04	4.69E-02
Benzo[b]fluoranthene	-	-	-	-	-	-
Benzo[k]fluoranthene	-	-	-	-	-	-
Chromium(III), Insoluble Salts	-	4.95E-05	4.64E-06	-	-	4.64E-06
Chrysene	-	-	-	-	-	-
Cobalt	3.94E-05	1.14E-01	1.07E-02	-	3.94E-05	1.08E-02
Copper	-	6.88E-03	6.45E-04	-	-	6.45E-04
Dibenz[a,h]anthracene	-	-	-	-	-	-
Indeno[1,2,3-cd]pyrene	-	-	-	-	-	-
Isopropanol	-	-	-	-	-	-
Manganese (Non-diet)	1.08E-03	3.27E-01	3.05E-02	-	1.08E-03	3.16E-02
Mercury (elemental)	2.54E-03	2.54E-03	-	-	2.54E-03	2.54E-03
Thallium Sulfate	-	6.01E-01	5.63E-02	-	-	5.63E-02
<b>*Total Risk/HI</b>	<b>4.09E-03</b>	<b>1.63E+00</b>	<b>1.42E-01</b>	<b>1.79E-02</b>	<b>4.09E-03</b>	<b>1.64E-01</b>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{soil}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{veg}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_c$ (PEF acres)	0.5	0.5
$A_c$ (VF acres)	0.5	0.5
$A_c$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1



## Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

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Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-		PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-		PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-		PAH	4.76E-02
-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	5.47E+04	-	-	-	-		-		-		INORGANIC	-

# Site-specific Outdoor Worker Regional Screening Levels (RSL) for Soil

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D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-	4.50E+01
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05	-
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-	3.50E+01
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06	-
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04	-	-
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ib</sub> \ (cm <sup>2</sup> /s)	D <sub>iwb</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-	1.36E+09
Antimony (metallic)	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-	-	-	1.36E+09
Arsenic, Inorganic	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-	-	-	1.36E+09
Barium	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-	-	-	1.36E+09
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Chromium(III), Insoluble Salts	-	-		-		-		INORGANIC	-	-	-	1.36E+09
Chrysene	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02	6.75E-06	-	1.36E+09
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-	1.36E+09
Copper	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-	-	-	1.36E+09
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02	5.21E-06	-	1.36E+09
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02	5.23E-06	-	1.36E+09
Manganese (Non-diet)	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-	-	-	1.36E+09
Mercury (elemental)	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09
Thallium Sulfate	-	-		-		-		INORGANIC	-	-	-	1.36E+09
<i>*Total Risk/HI</i>	-	-		-		-			-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	-	1.49E+04	-	-	-	-	6.33E-03	-	2.48E-04	6.58E-03
Antimony (metallic)	-	2.30E+00	-	-	-	-	2.44E-03	-	-	2.44E-03
Arsenic, Inorganic	-	1.06E+01	1.45E-06	3.06E-07	1.36E-09	1.75E-06	9.00E-03	1.91E-03	5.89E-05	1.10E-02
Barium	-	3.58E+02	-	-	-	-	7.60E-04	-	5.96E-05	8.20E-04
Benz[a]anthracene	4.41E+06	2.67E+01	4.05E-07	2.23E-07	1.47E-08	6.42E-07	-	-	-	-
Benzo[a]pyrene	-	2.58E+01	3.91E-06	2.15E-06	4.60E-10	6.06E-06	3.65E-02	2.01E-02	1.07E-03	5.76E-02
Benzo[b]fluoranthene	-	2.76E+01	4.19E-07	2.30E-07	4.93E-11	6.49E-07	-	-	-	-
Benzo[k]fluoranthene	-	1.22E+01	1.86E-08	1.02E-08	2.19E-12	2.88E-08	-	-	-	-
Chromium(III), Insoluble Salts	-	2.16E+01	-	-	-	-	6.12E-06	-	-	6.12E-06
Chrysene	-	2.48E+01	3.76E-09	2.07E-09	4.43E-13	5.83E-09	-	-	-	-
Cobalt	-	9.99E+00	-	-	2.68E-09	2.68E-09	1.41E-02	-	1.39E-04	1.43E-02
Copper	-	8.02E+01	-	-	-	-	8.51E-04	-	-	8.51E-04
Dibenz[a,h]anthracene	-	3.85E+00	5.84E-07	3.21E-07	6.87E-11	9.05E-07	-	-	-	-
Indeno[1,2,3-cd]pyrene	-	1.79E+01	2.71E-07	1.49E-07	3.19E-11	4.20E-07	-	-	-	-
Manganese (Non-diet)	-	2.28E+03	-	-	-	-	4.03E-02	-	3.79E-03	4.40E-02
Mercury (elemental)	3.47E+04	8.21E-01	-	-	-	-	-	-	8.93E-03	8.93E-03
Thallium Sulfate	-	3.50E+00	-	-	-	-	7.43E-02	-	-	7.43E-02
<i>*Total Risk/HI</i>	-	-	<i>7.05E-06</i>	<i>3.39E-06</i>	<i>1.94E-08</i>	<i>1.05E-05</i>	<i>1.85E-01</i>	<i>2.20E-02</i>	<i>1.43E-02</i>	<i>2.21E-01</i>

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.2302
A (VF Dispersion Constant)	11.911	11.911
A (VF Dispersion Constant - Mass Limit)	11.911	11.911
B (PEF Dispersion Constant)	18.7762	18.7762
B (VF Dispersion Constant)	18.4385	18.4385
B (VF Dispersion Constant - Mass Limit)	18.4385	18.4385
City (PEF Climate Zone) Selection	Default	Default
City (VF Climate Zone) Selection	Default	Default
C (PEF Dispersion Constant)	216.108	216.108
C (VF Dispersion Constant)	209.7845	209.7845
C (VF Dispersion Constant - Mass Limit)	209.7845	209.7845
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on $U_{crit}/U_c$ ) unitless	0.194	0.194
n (total soil porosity) $L_{pore}/L_{total}$	0.43396	0.43396
$\rho_b$ (dry soil bulk density) g/cm <sup>3</sup>	1.5	1.5
$\rho_b$ (dry soil bulk density - mass limit) g/cm <sup>3</sup>	1.5	1.5
PEF (particulate emission factor) m <sup>3</sup> /kg	1359344438	1359344438
$\rho_p$ (soil particle density) g/cm <sup>3</sup>	2.65	2.65
$Q/C_{wind}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	93.77	93.77
$Q/C_{soil}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$Q/C_{veg}$ (g/m <sup>2</sup> -s per kg/m <sup>3</sup> )	68.18	68.18
$A_e$ (PEF acres)	0.5	0.5
$A_e$ (VF acres)	0.5	0.5
$A_e$ (VF mass-limit acres)	0.5	0.5
$AF_{ow}$ (skin adherence factor - outdoor worker) mg/cm <sup>2</sup>	0.12	0.12
$AT_{ow}$ (averaging time - outdoor worker)	365	365
$BW_{ow}$ (body weight - outdoor worker)	80	80
$ED_{ow}$ (exposure duration - outdoor worker) yr	25	25
$EF_{ow}$ (exposure frequency - outdoor worker) day/yr	225	124

# Site-specific Outdoor Worker Equation Inputs for Soil

\* Inputted values different from Outdoor Worker defaults are highlighted.

Variable	Outdoor Worker Soil Default Value	Form-input Value
ET <sub>ow</sub> (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>ow</sub> (soil ingestion rate - outdoor worker) mg/day	100	100
LT (lifetime) yr	70	70
SA <sub>ow</sub> (surface area - outdoor worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
T <sub>w</sub> (groundwater temperature) Celsius	25	25
Theta <sub>a</sub> (air-filled soil porosity) L <sub>air</sub> /L <sub>cnil</sub>	0.28396	0.28396
Theta <sub>w</sub> (water-filled soil porosity) L <sub>water</sub> /L <sub>cnil</sub>	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U <sub>m</sub> (mean annual wind speed) m/s	4.69	4.69
U <sub>i</sub> (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5

## Site-specific

# Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	P	5.00E-03	P	1	-	1
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	I	-		0.15	-	1
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	I	5.00E-04	H	0.07	-	1
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13	1
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	I	-		0.013	-	1
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13	1
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1
Copper	7440-50-8	No	No	Inorganics	-		-		4.00E-02	H	-		1	-	1
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13	1
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13	1
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S	5.00E-05	I	0.04	-	1
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	I	1	-	1
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		2.00E-05	X	-		1	-	1



# Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

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Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>10</sub> (cm <sup>2</sup> /s)
-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
-	-	-	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-
-	-	-	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-
-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02
-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-		PAH	4.76E-02
-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-		PAH	4.76E-02
-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-		PAH	4.76E-02
-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02
-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
-	-	-	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-
-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-		PAH	4.46E-02
-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-		PAH	4.48E-02
-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
-	5.47E+04	-	-	-	-		-		-		INORGANIC	-

## Site-specific

## Outdoor Worker Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)	Volatilization Factor (m <sup>3</sup> /kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	-	1.36E+09	-	-	-	-	-	2.35E+05	-	6.00E+06	2.27E+05	2.27E+05 max
-	-	1.36E+09	-	-	-	-	-	9.42E+01	-	-	9.42E+01	9.42E+01 nc
-	-	1.36E+09	-	7.33E+00	3.46E+01	7.82E+03	6.04E+00	1.18E+02	5.56E+02	1.80E+04	9.67E+01	6.04E+00 ca*
-	-	1.36E+09	-	-	-	-	-	4.71E+04	-	6.00E+05	4.37E+04	4.37E+04 nc
6.75E-06	6.83E-10	1.36E+09	4.41E+06	6.59E+01	1.20E+02	1.81E+03	4.16E+01	-	-	-	-	4.16E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	7.06E+01	1.28E+02	2.40E+03	4.47E+01	4.25E+00 ca*
5.56E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
5.56E-06	-	1.36E+09	-	6.59E+02	1.20E+03	5.60E+06	4.25E+02	-	-	-	-	4.25E+02 ca
-	-	1.36E+09	-	-	-	-	-	3.53E+05	-	-	3.53E+05	3.53E+05 max
6.75E-06	-	1.36E+09	-	6.59E+03	1.20E+04	5.60E+07	4.25E+03	-	-	-	-	4.25E+03 ca
-	-	1.36E+09	-	-	-	3.73E+03	3.73E+03	7.06E+01	-	7.20E+03	7.00E+01	7.00E+01 nc
-	-	1.36E+09	-	-	-	-	-	9.42E+03	-	-	9.42E+03	9.42E+03 nc
5.21E-06	-	1.36E+09	-	6.59E+00	1.20E+01	5.60E+04	4.25E+00	-	-	-	-	4.25E+00 ca
5.23E-06	-	1.36E+09	-	6.59E+01	1.20E+02	5.60E+05	4.25E+01	-	-	-	-	4.25E+01 ca
-	-	1.36E+09	-	-	-	-	-	5.65E+03	-	6.00E+04	5.17E+03	5.17E+03 nc
6.30E-06	1.10E-05	1.36E+09	3.47E+04	-	-	-	-	-	-	9.20E+00	9.20E+00	9.20E+00 sat
-	-	1.36E+09	-	-	-	-	-	4.71E+00	-	-	4.71E+00	4.71E+00 nc

# Site-specific Outdoor Worker Risk for Soil

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>2</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> (cm <sup>3</sup> /g)	K <sub>d</sub> (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	P	5.00E-03	P	1	-	1	-	-	-	1.50E+03
Antimony (metallic)	-	-	-	-	4.00E-04	I	-	-	0.15	-	1	-	-	-	4.50E+01
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I	1.50E-05	C	1	0.03	0.6	-	-	-	2.90E+01
Barium	-	-	-	-	2.00E-01	I	5.00E-04	H	0.07	-	1	-	-	-	4.10E+01
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05	1.06E+03
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I	2.00E-06	I	1	0.13	1	-	1.62E-03	5.87E+05	-
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05	-
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05	-
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	I	-	-	0.013	-	1	-	-	-	1.80E+06
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05	-
Cobalt	-	-	9.00E-03	P	3.00E-04	P	6.00E-06	P	1	-	1	-	-	-	4.50E+01
Copper	-	-	-	-	4.00E-02	H	-	-	1	-	1	-	-	-	3.50E+01
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06	-
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06	-
Manganese (Non-diet)	-	-	-	-	2.40E-02	S	5.00E-05	I	0.04	-	1	-	-	-	6.50E+01
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	I	1	-	1	3.13E+00	6.00E-02	-	5.20E+01
Thallium Sulfate	-	-	-	-	2.00E-05	X	-	-	1	-	1	-	5.47E+04	-	-
<i>*Total Risk/HI</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ib</sub> \ (cm <sup>2</sup> /s)	D <sub>iwb</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)	Particulate Emission Factor (m <sup>3</sup> /kg)
Aluminum	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-	1.36E+09
Antimony (metallic)	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-	-	-	1.36E+09
Arsenic, Inorganic	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-	-	-	1.36E+09
Barium	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-	-	-	1.36E+09
Benz[a]anthracene	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10	1.36E+09
Benzo[a]pyrene	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Benzo[b]fluoranthene	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Benzo[k]fluoranthene	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02	5.56E-06	-	1.36E+09
Chromium(III), Insoluble Salts	-	-		-		-		INORGANIC	-	-	-	1.36E+09
Chrysene	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02	6.75E-06	-	1.36E+09
Cobalt	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-	1.36E+09
Copper	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-	-	-	1.36E+09
Dibenz[a,h]anthracene	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02	5.21E-06	-	1.36E+09
Indeno[1,2,3-cd]pyrene	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-		PAH	4.48E-02	5.23E-06	-	1.36E+09
Manganese (Non-diet)	-	-		2368.15	PHYSROP	4325	CRC89	INORGANIC	-	-	-	1.36E+09
Mercury (elemental)	8.62E-03	3.52E-01	PHYSROP VP/S	629.75	PHYSROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05	1.36E+09
Thallium Sulfate	-	-		-		-		INORGANIC	-	-	-	1.36E+09
<i>*Total Risk/HI</i>	-	-		-		-			-	-	-	-

# Site-specific Outdoor Worker Risk for Soil

Chemical	Volatilization Factor (m <sup>3</sup> /kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	-	1.16E+04	-	-	-	-	4.92E-03	-	1.93E-04	5.11E-03
Antimony (metallic)	-	5.04E+00	-	-	-	-	5.35E-03	-	-	5.35E-03
Arsenic, Inorganic	-	1.10E+01	1.51E-06	3.19E-07	1.41E-09	1.83E-06	9.38E-03	1.98E-03	6.13E-05	1.14E-02
Barium	-	3.06E+02	-	-	-	-	6.49E-04	-	5.10E-05	7.00E-04
Benz[a]anthracene	4.41E+06	1.83E+01	2.77E-07	1.52E-07	1.01E-08	4.39E-07	-	-	-	-
Benzo[a]pyrene	-	1.79E+01	2.71E-06	1.49E-06	3.20E-10	4.21E-06	2.53E-02	1.39E-02	7.46E-04	4.00E-02
Benzo[b]fluoranthene	-	1.90E+01	2.88E-07	1.59E-07	3.40E-11	4.47E-07	-	-	-	-
Benzo[k]fluoranthene	-	7.68E+00	1.16E-08	6.41E-09	1.37E-12	1.81E-08	-	-	-	-
Chromium(III), Insoluble Salts	-	2.51E+01	-	-	-	-	7.10E-06	-	-	7.10E-06
Chrysene	-	1.63E+01	2.48E-09	1.36E-09	2.92E-13	3.84E-09	-	-	-	-
Cobalt	-	7.18E+00	-	-	1.92E-09	1.92E-09	1.02E-02	-	9.97E-05	1.03E-02
Copper	-	2.78E+02	-	-	-	-	2.95E-03	-	-	2.95E-03
Dibenz[a,h]anthracene	-	2.50E+00	3.79E-07	2.09E-07	4.46E-11	5.88E-07	-	-	-	-
Indeno[1,2,3-cd]pyrene	-	1.14E+01	1.73E-07	9.54E-08	2.04E-11	2.69E-07	-	-	-	-
Manganese (Non-diet)	-	1.09E+03	-	-	-	-	1.93E-02	-	1.81E-03	2.11E-02
Mercury (elemental)	3.47E+04	5.90E-01	-	-	-	-	-	-	6.42E-03	6.42E-03
Thallium Sulfate	-	1.57E+00	-	-	-	-	3.33E-02	-	-	3.33E-02
<i>*Total Risk/HI</i>	-	-	<i>5.35E-06</i>	<i>2.44E-06</i>	<i>1.38E-08</i>	<i>7.80E-06</i>	<i>1.11E-01</i>	<i>1.59E-02</i>	<i>9.38E-03</i>	<i>1.37E-01</i>

# Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
A (PEF Dispersion Constant)	2.4538	2.4538
A <sub>conf</sub> (areal extent of site) m <sup>2</sup>	2023.43	2023.43
B (PEF Dispersion Constant)	17.5660	17.5660
C (PEF Dispersion Constant)	189.0426	189.0426
F <sub>n</sub> Unitless Dispersion Correction Factor	0.185837208	0.1858372087329
F(x) (function dependant on U <sub>wind</sub> /U <sub>h</sub> , derived using Cowherd et al. (1985))	0.194	0.194
M <sub>moist</sub> (Gravimetric soil moisture content) %	7.9	7.9
M <sub>moistrav</sub> (Gravimetric soil moisture content) %	12	12
M <sub>wind</sub> (dust emitted by wind erosion) g	51288.84717	51288.84717
N <sub>dump</sub> (number of times soil is dumped)	2	2
N <sub>till</sub> (number of times soil is tilled)	2	2
Q/C <sub>SA</sub> (inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source) g/m <sup>3</sup> kg/m <sup>3</sup>	14.31407	14.31407
p <sub>oil</sub> (density) g/cm <sup>3</sup> - chemical-specific	1.68	1.68
s <sub>soil</sub> (soil silt content) %	6.9	6.9
AF <sub>cw</sub> (skin adherence factor - construction worker) mg/cm <sup>2</sup>	0.3	0.3
AT <sub>cw</sub> (averaging time - construction worker) days	365	350
BW <sub>cw</sub> (body weight - construction worker) kg	80	80
ED <sub>cw</sub> (exposure duration - construction worker) yr	1	1
EF <sub>cw</sub> (exposure frequency - construction worker) day/yr	250	250
ET <sub>cw</sub> (exposure time - construction worker) hr/day	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS <sub>cw</sub> (soil ingestion rate - construction worker) mg/day	330	330
LT (lifetime) yr	70	70
SA <sub>cw</sub> (surface area - construction worker) cm <sup>2</sup> /day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
S <sub>doz</sub> (dozing speed) kph	11.4	11.4
S <sub>grade</sub> (grading speed) kph	11.4	11.4
s <sub>till</sub> (soil silt content) %	18	18

# Construction Worker Equation Inputs for Soil - Other Construction Activities

\* Inputted values different from Construction Worker defaults are highlighted.

Variable	Construction Worker Soil - Other Default Value	Form-input Value
$t_c$ (overall duration of construction) hours	8400	8400
$T_c$ (overall duration of construction) s	30240000	30240000
T (time over which traffic occurs) s	7200000	7200000
$T_t$ (overall duration of traffic) s	7200000	7200000
$U_m$ (mean annual wind speed) m/s	4.69	4.69
$U_t$ (equivalent threshold value) m/s	11.32	11.32
V (fraction of vegetative cover)	0	0

# Site-specific

## Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Aluminum	7429-90-5	No	No	Inorganics	-		-		1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		-		4.00E-04	P /Subchronic	-		0.15	-
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03
Barium	7440-39-3	No	No	Inorganics	-		-		2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-
Benz[a]anthracene	56-55-3	Yes	Yes	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Benzo[a]pyrene	50-32-8	Yes	No	Organics	1.00E+00	I	6.00E-04	I	3.00E-04	I /Chronic	2.00E-06	I /Chronic	1	0.13
Benzo[b]fluoranthene	205-99-2	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13
Benzo[k]fluoranthene	207-08-9	Yes	No	Organics	1.00E-02	E	6.00E-06	E	-		-		1	0.13
Chromium(III), Insoluble Salts	16065-83-1	No	No	Inorganics	-		-		1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-
Chrysene	218-01-9	Yes	No	Organics	1.00E-03	E	6.00E-07	E	-		-		1	0.13
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-
Copper	7440-50-8	No	No	Inorganics	-		-		1.00E-02	A /Subchronic	-		1	-
Dibenz[a,h]anthracene	53-70-3	Yes	No	Organics	1.00E+00	E	6.00E-04	E	-		-		1	0.13
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	Organics	1.00E-01	E	6.00E-05	E	-		-		1	0.13



# Site-specific

## Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia}$ (cm <sup>2</sup> /s)
1	-	-	-	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-
1	-	-	-	4.50E+01	-	-		1908.15	PHYSROP	5070	YAWS	INORGANIC	-
0.6	-	-	-	2.90E+01	-	-		888.15	PHYSROP	1673	CRC89	INORGANIC	-
1	-	-	-	4.10E+01	-	-		1873.15	PHYSROP	3572.13	YAWS	INORGANIC	-
1	-	9.40E-03	1.77E+05	1.06E+03	1.20E-05	4.91E-04	PHYSROP	710.75	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	1.62E-03	5.87E+05	-	4.57E-07	1.87E-05	PHYSROP	768.15	PHYSROP	-		PAH	4.76E-02
1	-	1.50E-03	5.99E+05	-	6.57E-07	2.69E-05	PHYSROP	715.9	EPI	-		PAH	4.76E-02
1	-	8.00E-04	5.87E+05	-	5.84E-07	2.39E-05	PHYSROP	753.15	PHYSROP	-		PAH	4.76E-02
1	-	-	-	1.80E+06	-	-		-		-		INORGANIC	-
1	-	2.00E-03	1.81E+05	-	5.23E-06	2.14E-04	PHYSROP	721.15	PHYSROP	979	YAWS	PAH	2.61E-02
1	-	-	-	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-
1	-	-	-	3.50E+01	-	-		2868.15	PHYSROP	5123	YAWS	INORGANIC	-
1	-	2.49E-03	1.91E+06	-	1.41E-07	5.76E-06	EPI	797.15	PHYSROP	-		PAH	4.46E-02
1	-	1.90E-04	1.95E+06	-	3.48E-07	1.42E-05	PHYSROP	809.15	PHYSROP	-		PAH	4.48E-02

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	1.36E+09	-	-	-	-	-	3.39E+04	-	2.85E+06	3.35E+04	3.35E+04 nc
-	-	1.36E+09	-	-	-	-	-	1.36E+01	-	-	1.36E+01	1.36E+01 nc
-	-	1.36E+09	-	2.75E+01	1.72E+02	9.69E+04	2.37E+01	1.70E+01	1.06E+02	8.56E+03	1.46E+01	1.46E+01 nc
-	-	1.36E+09	-	-	-	-	-	6.79E+03	-	2.85E+06	6.77E+03	6.77E+03 nc
6.75E-06	6.83E-10	1.36E+09	9.57E+05	2.48E+02	5.94E+02	4.89E+03	1.69E+02	-	-	-	-	1.69E+02 ca
5.56E-06	-	1.36E+09	-	2.48E+01	5.94E+01	6.95E+05	1.75E+01	1.02E+01	2.44E+01	1.14E+03	7.14E+00	7.14E+00 nc
5.56E-06	-	1.36E+09	-	2.48E+02	5.94E+02	6.95E+06	1.75E+02	-	-	-	-	1.75E+02 ca
5.56E-06	-	1.36E+09	-	2.48E+03	5.94E+03	6.95E+07	1.75E+03	-	-	-	-	1.75E+03 ca
-	-	1.36E+09	-	-	-	-	-	5.09E+04	-	2.85E+06	5.00E+04	5.00E+04 nc
6.75E-06	-	1.36E+09	-	2.48E+04	5.94E+04	6.95E+08	1.75E+04	-	-	-	-	1.75E+04 ca
-	-	1.36E+09	-	-	-	4.63E+04	4.63E+04	1.02E+02	-	1.14E+04	1.01E+02	1.01E+02 nc
-	-	1.36E+09	-	-	-	-	-	3.39E+02	-	-	3.39E+02	3.39E+02 nc
5.21E-06	-	1.36E+09	-	2.48E+01	5.94E+01	6.95E+05	1.75E+01	-	-	-	-	1.75E+01 ca
5.23E-06	-	1.36E+09	-	2.48E+02	5.94E+02	6.95E+06	1.75E+02	-	-	-	-	1.75E+02 ca

# Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF <sub>0</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>0</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		-		2.40E-02	S /Chronic	5.00E-05	I /Chronic	0.04	-
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		-		-		3.00E-04	H /Subchronic	1	-
Thallium Sulfate	7446-18-6	No	No	Inorganics	-		-		5.00E-05	X /Subchronic	-		1	-

## Site-specific

# Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	$K_{oc}$ (cm <sup>3</sup> /g)	$K_d$ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	$D_{ia}$ (cm <sup>2</sup> /s)
1	-	-	-	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-
1	3.13E+00	6.00E-02	-	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02
1	-	5.47E+04	-	-	-	-		-		-		INORGANIC	-

# Site-specific Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; \* = where: nc SL < 100X ca SL; \*\* = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

$D_{iw}$ ( $\text{cm}^2/\text{s}$ )	$D_A$ ( $\text{cm}^2/\text{s}$ )	Particulate Emission Factor ( $\text{m}^3/\text{kg}$ )	Volatilization Factor ( $\text{m}^3/\text{kg}$ )	Ingestion SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Dermal SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Inhalation SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Carcinogenic SL TR=1E-06 ( $\text{mg}/\text{kg}$ )	Ingestion SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Dermal SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Inhalation SL THQ=0.1 ( $\text{mg}/\text{kg}$ )	Noncarcinogenic SL THI=0.1 ( $\text{mg}/\text{kg}$ )	Screening Level ( $\text{mg}/\text{kg}$ )
-	-	1.36E+09	-	-	-	-	-	8.15E+02	-	2.85E+04	7.92E+02	7.92E+02 nc
6.30E-06	1.10E-05	1.36E+09	7.53E+03	-	-	-	-	-	-	9.49E-01	9.49E-01	9.49E-01 nc
-	-	1.36E+09	-	-	-	-	-	1.70E+00	-	-	1.70E+00	1.70E+00 nc

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>o</sub> Ref	IUR (ug/m <sup>3</sup> ) <sup>-1</sup>	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m <sup>3</sup> )	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K <sub>oc</sub> \ (cm <sup>3</sup> /g)
Aluminum	-	-	-	-	1.00E+00	A /Subchronic	5.00E-03	P /Chronic	1	-	1	-	-	-
Antimony (metallic)	-	-	-	-	4.00E-04	P /Subchronic	-	-	0.15	-	1	-	-	-
Arsenic, Inorganic	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03	0.6	-	-	-
Barium	-	-	-	-	2.00E-01	A /Subchronic	5.00E-03	H /Subchronic	0.07	-	1	-	-	-
Benz[a]anthracene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	9.40E-03	1.77E+05
Benzo[a]pyrene	1.00E+00	I	6.00E-04	I	3.00E-04	I /Chronic	2.00E-06	I /Chronic	1	0.13	1	-	1.62E-03	5.87E+05
Benzo[b]fluoranthene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.50E-03	5.99E+05
Benzo[k]fluoranthene	1.00E-02	E	6.00E-06	E	-	-	-	-	1	0.13	1	-	8.00E-04	5.87E+05
Chromium(III), Insoluble Salts	-	-	-	-	1.50E+00	H /Subchronic	5.00E-03	A /Subchronic	0.013	-	1	-	-	-
Chrysene	1.00E-03	E	6.00E-07	E	-	-	-	-	1	0.13	1	-	2.00E-03	1.81E+05
Cobalt	-	-	9.00E-03	P	3.00E-03	P /Subchronic	2.00E-05	P /Subchronic	1	-	1	-	-	-
Copper	-	-	-	-	1.00E-02	A /Subchronic	-	-	1	-	1	-	-	-
Dibenz[a,h]anthracene	1.00E+00	E	6.00E-04	E	-	-	-	-	1	0.13	1	-	2.49E-03	1.91E+06
Indeno[1,2,3-cd]pyrene	1.00E-01	E	6.00E-05	E	-	-	-	-	1	0.13	1	-	1.90E-04	1.95E+06
Manganese (Non-diet)	-	-	-	-	2.40E-02	S /Chronic	5.00E-05	I /Chronic	0.04	-	1	-	-	-
Mercury (elemental)	-	-	-	-	-	-	3.00E-04	H /Subchronic	1	-	1	3.13E+00	6.00E-02	-
Thallium Sulfate	-	-	-	-	5.00E-05	X /Subchronic	-	-	1	-	1	-	5.47E+04	-
<i>*Total Risk/Hi</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	K <sub>d</sub> \ (cm <sup>3</sup> /g)	HLC (atm-m <sup>3</sup> /mole)	Henry's Law Constant Used in Calcs (unitless)	H <sup>+</sup> and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D <sub>ia</sub> \ (cm <sup>2</sup> /s)	D <sub>iw</sub> \ (cm <sup>2</sup> /s)	D <sub>A</sub> \ (cm <sup>2</sup> /s)
Aluminum	1.50E+03	-	-		2792.15	CRC89	6700	CRC89	INORGANIC	-	-	-
Antimony (metallic)	4.50E+01	-	-		1908.15	PHYSPROP	5070	YAWS	INORGANIC	-	-	-
Arsenic, Inorganic	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-	-	-
Barium	4.10E+01	-	-		1873.15	PHYSPROP	3572.13	YAWS	INORGANIC	-	-	-
Benz[a]anthracene	1.06E+03	1.20E-05	4.91E-04	PHYSPROP	710.75	PHYSPROP	979	YAWS	PAH	2.61E-02	6.75E-06	6.83E-10
Benzo[a]pyrene	-	4.57E-07	1.87E-05	PHYSPROP	768.15	PHYSPROP	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[b]fluoranthene	-	6.57E-07	2.69E-05	PHYSPROP	715.9	EPI	-	-	PAH	4.76E-02	5.56E-06	-
Benzo[k]fluoranthene	-	5.84E-07	2.39E-05	PHYSPROP	753.15	PHYSPROP	-	-	PAH	4.76E-02	5.56E-06	-
Chromium(III), Insoluble Salts	1.80E+06	-	-		-		-	-	INORGANIC	-	-	-
Chrysene	-	5.23E-06	2.14E-04	PHYSPROP	721.15	PHYSPROP	979	YAWS	PAH	2.61E-02	6.75E-06	-
Cobalt	4.50E+01	-	-		3200.15	CRC89	7398.48	YAWS	INORGANIC	-	-	-
Copper	3.50E+01	-	-		2868.15	PHYSPROP	5123	YAWS	INORGANIC	-	-	-
Dibenz[a,h]anthracene	-	1.41E-07	5.76E-06	EPI	797.15	PHYSPROP	-	-	PAH	4.46E-02	5.21E-06	-
Indeno[1,2,3-cd]pyrene	-	3.48E-07	1.42E-05	PHYSPROP	809.15	PHYSPROP	-	-	PAH	4.48E-02	5.23E-06	-
Manganese (Non-diet)	6.50E+01	-	-		2368.15	PHYSPROP	4325	CRC89	INORGANIC	-	-	-
Mercury (elemental)	5.20E+01	8.62E-03	3.52E-01	PHYSPROP VP/S	629.75	PHYSPROP	1764	CRC89	INORGANIC	3.07E-02	6.30E-06	1.10E-05
Thallium Sulfate	-	-	-		-		-	-	INORGANIC	-	-	-
<i>*Total Risk/HI</i>	-	-	-		-		-	-		-	-	-

# Site-specific Construction Worker Risk for Soil - Other Construction Activities

Chemical	Particulate Emission Factor (m³/kg)	Volatilization Factor (m³/kg)	Concentration (mg/kg)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion HQ	Dermal HQ	Inhalation HQ	Noncarcinogenic HI
Aluminum	1.36E+09	-	1.16E+04	-	-	-	-	3.41E-02	-	4.06E-04	3.45E-02
Antimony (metallic)	1.36E+09	-	5.04E+00	-	-	-	-	3.71E-02	-	-	3.71E-02
Arsenic, Inorganic	1.36E+09	-	1.10E+01	4.01E-07	6.43E-08	1.14E-10	4.65E-07	6.51E-02	1.04E-02	1.29E-04	7.56E-02
Barium	1.36E+09	-	3.06E+02	-	-	-	-	4.51E-03	-	1.07E-05	4.52E-03
Benz[a]anthracene	1.36E+09	9.57E+05	1.83E+01	7.37E-08	3.07E-08	3.73E-09	1.08E-07	-	-	-	-
Benzo[a]pyrene	1.36E+09	-	1.79E+01	7.22E-07	3.01E-07	2.58E-11	1.02E-06	1.76E-01	7.33E-02	1.57E-03	2.51E-01
Benzo[b]fluoranthene	1.36E+09	-	1.90E+01	7.68E-08	3.20E-08	2.74E-12	1.09E-07	-	-	-	-
Benzo[k]fluoranthene	1.36E+09	-	7.68E+00	3.10E-09	1.29E-09	1.11E-13	4.39E-09	-	-	-	-
Chromium(III), Insoluble Salts	1.36E+09	-	2.51E+01	-	-	-	-	4.93E-05	-	8.79E-07	5.02E-05
Chrysene	1.36E+09	-	1.63E+01	6.60E-10	2.75E-10	2.35E-14	9.34E-10	-	-	-	-
Cobalt	1.36E+09	-	7.18E+00	-	-	1.55E-10	1.55E-10	7.05E-03	-	6.29E-05	7.11E-03
Copper	1.36E+09	-	2.78E+02	-	-	-	-	8.20E-02	-	-	8.20E-02
Dibenz[a,h]anthracene	1.36E+09	-	2.50E+00	1.01E-07	4.21E-08	3.60E-12	1.43E-07	-	-	-	-
Indeno[1,2,3-cd]pyrene	1.36E+09	-	1.14E+01	4.61E-08	1.92E-08	1.65E-12	6.54E-08	-	-	-	-
Manganese (Non-diet)	1.36E+09	-	1.09E+03	-	-	-	-	1.34E-01	-	3.81E-03	1.38E-01
Mercury (elemental)	1.36E+09	7.53E+03	5.90E-01	-	-	-	-	-	-	6.22E-02	6.22E-02
Thallium Sulfate	1.36E+09	-	1.57E+00	-	-	-	-	9.25E-02	-	-	9.25E-02
<b>*Total Risk/HI</b>	-	-	-	<b>1.42E-06</b>	<b>4.91E-07</b>	<b>4.04E-09</b>	<b>1.92E-06</b>	<b>6.32E-01</b>	<b>8.37E-02</b>	<b>6.82E-02</b>	<b>7.84E-01</b>



	A	B	C	D	E	F	G	H	I	J	K	L	
1	<b>UCL Statistics for Data Sets with Non-Detects</b>												
2													
3	User Selected Options												
4	Date/Time of Computation		ProUCL 5.11/16/2020 7:51:04 PM										
5	From File		WP_SS_prouclin.xls										
6	Full Precision		OFF										
7	Confidence Coefficient		95%										
8	Number of Bootstrap Operations		2000										
9													
10													
11	<b>Aluminum</b>												
12													
13	<b>General Statistics</b>												
14	Total Number of Observations				6		Number of Distinct Observations				6		
15									Number of Missing Observations				0
16					Minimum		5920		Mean				10890
17					Maximum		17900		Median				8965
18					SD		4882		Std. Error of Mean				1993
19					Coefficient of Variation		0.448		Skewness				0.772
20													
21	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>												
22	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>												
23	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>												
24	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>												
25													
26	<b>Normal GOF Test</b>												
27	Shapiro Wilk Test Statistic				0.87		<b>Shapiro Wilk GOF Test</b>						
28	5% Shapiro Wilk Critical Value				0.788		Data appear Normal at 5% Significance Level						
29	Lilliefors Test Statistic				0.267		<b>Lilliefors GOF Test</b>						
30	5% Lilliefors Critical Value				0.325		Data appear Normal at 5% Significance Level						
31	<b>Data appear Normal at 5% Significance Level</b>												
32													
33	<b>Assuming Normal Distribution</b>												
34	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
35	95% Student's-t UCL				14907		95% Adjusted-CLT UCL (Chen-1995)				14840		
36									95% Modified-t UCL (Johnson-1978)				15011
37													
38	<b>Gamma GOF Test</b>												
39	A-D Test Statistic				0.397		<b>Anderson-Darling Gamma GOF Test</b>						
40	5% A-D Critical Value				0.698		Detected data appear Gamma Distributed at 5% Significance Level						
41	K-S Test Statistic				0.232		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
42	5% K-S Critical Value				0.333		Detected data appear Gamma Distributed at 5% Significance Level						
43	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
44													
45	<b>Gamma Statistics</b>												
46	k hat (MLE)				6.364		k star (bias corrected MLE)				3.293		
47	Theta hat (MLE)				1711		Theta star (bias corrected MLE)				3307		
48	nu hat (MLE)				76.37		nu star (bias corrected)				39.52		
49	MLE Mean (bias corrected)				10890		MLE Sd (bias corrected)				6001		
50									Approximate Chi Square Value (0.05)				26.12
51	Adjusted Level of Significance				0.0122		Adjusted Chi Square Value				22.26		
52													
53	<b>Assuming Gamma Distribution</b>												

	A	B	C	D	E	F	G	H	I	J	K	L
54	95% Approximate Gamma UCL (use when n>=50))					16478	95% Adjusted Gamma UCL (use when n<50)					19330
55												
56	<b>Lognormal GOF Test</b>											
57	Shapiro Wilk Test Statistic					0.921	Shapiro Wilk Lognormal GOF Test					
58	5% Shapiro Wilk Critical Value					0.788	Data appear Lognormal at 5% Significance Level					
59	Lilliefors Test Statistic					0.204	Lilliefors Lognormal GOF Test					
60	5% Lilliefors Critical Value					0.325	Data appear Lognormal at 5% Significance Level					
61	<b>Data appear Lognormal at 5% Significance Level</b>											
62												
63	<b>Lognormal Statistics</b>											
64	Minimum of Logged Data					8.686	Mean of logged Data					9.215
65	Maximum of Logged Data					9.793	SD of logged Data					0.435
66												
67	<b>Assuming Lognormal Distribution</b>											
68	95% H-UCL					17934	90% Chebyshev (MVUE) UCL					16649
69	95% Chebyshev (MVUE) UCL					19271	97.5% Chebyshev (MVUE) UCL					22909
70	99% Chebyshev (MVUE) UCL					30055						
71												
72	<b>Nonparametric Distribution Free UCL Statistics</b>											
73	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
74												
75	<b>Nonparametric Distribution Free UCLs</b>											
76	95% CLT UCL					14169	95% Jackknife UCL					14907
77	95% Standard Bootstrap UCL					13854	95% Bootstrap-t UCL					21251
78	95% Hall's Bootstrap UCL					46957	95% Percentile Bootstrap UCL					13983
79	95% BCA Bootstrap UCL					14212						
80	90% Chebyshev(Mean, Sd) UCL					16870	95% Chebyshev(Mean, Sd) UCL					19578
81	97.5% Chebyshev(Mean, Sd) UCL					23338	99% Chebyshev(Mean, Sd) UCL					30723
82												
83	<b>Suggested UCL to Use</b>											
84	95% Student's-t UCL					14907						
85												
86	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
87	Recommendations are based upon data size, data distribution, and skewness.											
88	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
89	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
90												
91	<b>Antimony</b>											
92												
93	<b>General Statistics</b>											
94	Total Number of Observations					6	Number of Distinct Observations					6
95	Number of Detects					3	Number of Non-Detects					3
96	Number of Distinct Detects					3	Number of Distinct Non-Detects					3
97	Minimum Detect					0.8	Minimum Non-Detect					6.4
98	Maximum Detect					2.3	Maximum Non-Detect					7
99	Variance Detects					0.563	Percent Non-Detects					50%
100	Mean Detects					1.533	SD Detects					0.751
101	Median Detects					1.5	CV Detects					0.489
102	Skewness Detects					0.199	Kurtosis Detects					N/A
103	Mean of Logged Detects					0.338	SD of Logged Detects					0.531
104												
105	<b>Warning: Data set has only 3 Detected Values.</b>											
106	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
107												
108												
109	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
110	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
111	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
112	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
113												
114	<b>Normal GOF Test on Detects Only</b>											
115		Shapiro Wilk Test Statistic			0.999						<b>Shapiro Wilk GOF Test</b>	
116		5% Shapiro Wilk Critical Value			0.767						Detected Data appear Normal at 5% Significance Level	
117		Lilliefors Test Statistic			0.184						<b>Lilliefors GOF Test</b>	
118		5% Lilliefors Critical Value			0.425						Detected Data appear Normal at 5% Significance Level	
119	<b>Detected Data appear Normal at 5% Significance Level</b>											
120												
121	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
122		KM Mean			1.533						KM Standard Error of Mean	0.433
123		KM SD			0.613						95% KM (BCA) UCL	N/A
124		95% KM (t) UCL			2.407						95% KM (Percentile Bootstrap) UCL	N/A
125		95% KM (z) UCL			2.246						95% KM Bootstrap t UCL	N/A
126		90% KM Chebyshev UCL			2.833						95% KM Chebyshev UCL	3.422
127		97.5% KM Chebyshev UCL			4.239						99% KM Chebyshev UCL	5.845
128												
129	<b>Gamma GOF Tests on Detected Observations Only</b>											
130	<b>Not Enough Data to Perform GOF Test</b>											
131												
132	<b>Gamma Statistics on Detected Data Only</b>											
133		k hat (MLE)			5.777						k star (bias corrected MLE)	N/A
134		Theta hat (MLE)			0.265						Theta star (bias corrected MLE)	N/A
135		nu hat (MLE)			34.66						nu star (bias corrected)	N/A
136		Mean (detects)			1.533							
137												
138	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
139	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
140	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
141	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
142	This is especially true when the sample size is small.											
143	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
144		Minimum			0.8						Mean	1.509
145		Maximum			2.3						Median	1.485
146		SD			0.475						CV	0.315
147		k hat (MLE)			11.36						k star (bias corrected MLE)	5.793
148		Theta hat (MLE)			0.133						Theta star (bias corrected MLE)	0.261
149		nu hat (MLE)			136.4						nu star (bias corrected)	69.52
150		Adjusted Level of Significance ( $\beta$ )			0.0122							
151		Approximate Chi Square Value (69.52, $\alpha$ )			51.32						Adjusted Chi Square Value (69.52, $\beta$ )	45.73
152		95% Gamma Approximate UCL (use when $n \geq 50$ )			2.044						95% Gamma Adjusted UCL (use when $n < 50$ )	N/A
153												
154	<b>Estimates of Gamma Parameters using KM Estimates</b>											
155		Mean (KM)			1.533						SD (KM)	0.613
156		Variance (KM)			0.376						SE of Mean (KM)	0.433
157		k hat (KM)			6.26						k star (KM)	3.241
158		nu hat (KM)			75.12						nu star (KM)	38.9
159		theta hat (KM)			0.245						theta star (KM)	0.473

	A	B	C	D	E	F	G	H	I	J	K	L	
160	80% gamma percentile (KM)				2.167	90% gamma percentile (KM)				2.675			
161	95% gamma percentile (KM)				3.148	99% gamma percentile (KM)				4.168			
162													
163	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
164	Approximate Chi Square Value (38.90, $\alpha$ )				25.61	Adjusted Chi Square Value (38.90, $\beta$ )				21.8			
165	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				2.329	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				2.736			
166													
167	<b>Lognormal GOF Test on Detected Observations Only</b>												
168	Shapiro Wilk Test Statistic				0.988	<b>Shapiro Wilk GOF Test</b>							
169	5% Shapiro Wilk Critical Value				0.767	Detected Data appear Lognormal at 5% Significance Level							
170	Lilliefors Test Statistic				0.217	<b>Lilliefors GOF Test</b>							
171	5% Lilliefors Critical Value				0.425	Detected Data appear Lognormal at 5% Significance Level							
172	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
173													
174	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
175	Mean in Original Scale				1.468	Mean in Log Scale				0.338			
176	SD in Original Scale				0.48	SD in Log Scale				0.336			
177	95% t UCL (assumes normality of ROS data)				1.863	95% Percentile Bootstrap UCL				N/A			
178	95% BCA Bootstrap UCL				N/A	95% Bootstrap t UCL				N/A			
179	95% H-UCL (Log ROS)				2.094								
180													
181	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
182	KM Mean (logged)				0.338	KM Geo Mean				1.403			
183	KM SD (logged)				0.434	95% Critical H Value (KM-Log)				2.486			
184	KM Standard Error of Mean (logged)				0.307	95% H-UCL (KM -Log)				2.496			
185	KM SD (logged)				0.434	95% Critical H Value (KM-Log)				2.486			
186	KM Standard Error of Mean (logged)				0.307								
187													
188	<b>DL/2 Statistics</b>												
189	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>						
190	Mean in Original Scale				2.433	Mean in Log Scale				0.771			
191	SD in Original Scale				1.098	SD in Log Scale				0.581			
192	95% t UCL (Assumes normality)				3.337	95% H-Stat UCL				5.361			
193	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
194													
195	<b>Nonparametric Distribution Free UCL Statistics</b>												
196	<b>Detected Data appear Normal Distributed at 5% Significance Level</b>												
197													
198	<b>Suggested UCL to Use</b>												
199	95% KM (t) UCL				2.407								
200	<b>Warning: Recommended UCL exceeds the maximum observation</b>												
201													
202	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
203	Recommendations are based upon data size, data distribution, and skewness.												
204	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
205	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
206													
207													
208	<b>Arsenic</b>												
209													
210	<b>General Statistics</b>												
211	Total Number of Observations				6	Number of Distinct Observations				6			
212						Number of Missing Observations				0			

	A	B	C	D	E	F	G	H	I	J	K	L
213					Minimum	3.6					Mean	8
214					Maximum	13					Median	7.75
215					SD	3.164					Std. Error of Mean	1.292
216					Coefficient of Variation	0.396					Skewness	0.368
217												
218	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
219	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
220	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
221	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
222												
223	<b>Normal GOF Test</b>											
224					Shapiro Wilk Test Statistic	0.983					<b>Shapiro Wilk GOF Test</b>	
225					5% Shapiro Wilk Critical Value	0.788					Data appear Normal at 5% Significance Level	
226					Lilliefors Test Statistic	0.167					<b>Lilliefors GOF Test</b>	
227					5% Lilliefors Critical Value	0.325					Data appear Normal at 5% Significance Level	
228	<b>Data appear Normal at 5% Significance Level</b>											
229												
230	<b>Assuming Normal Distribution</b>											
231	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
232					95% Student's-t UCL	10.6					95% Adjusted-CLT UCL (Chen-1995)	10.33
233											95% Modified-t UCL (Johnson-1978)	10.64
234												
235	<b>Gamma GOF Test</b>											
236					A-D Test Statistic	0.199					<b>Anderson-Darling Gamma GOF Test</b>	
237					5% A-D Critical Value	0.698					Detected data appear Gamma Distributed at 5% Significance Level	
238					K-S Test Statistic	0.149					<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
239					5% K-S Critical Value	0.333					Detected data appear Gamma Distributed at 5% Significance Level	
240	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
241												
242	<b>Gamma Statistics</b>											
243					k hat (MLE)	7.073					k star (bias corrected MLE)	3.648
244					Theta hat (MLE)	1.131					Theta star (bias corrected MLE)	2.193
245					nu hat (MLE)	84.88					nu star (bias corrected)	43.77
246					MLE Mean (bias corrected)	8					MLE Sd (bias corrected)	4.189
247											Approximate Chi Square Value (0.05)	29.6
248					Adjusted Level of Significance	0.0122					Adjusted Chi Square Value	25.47
249												
250	<b>Assuming Gamma Distribution</b>											
251					95% Approximate Gamma UCL (use when n>=50))	11.83					95% Adjusted Gamma UCL (use when n<50)	13.75
252												
253	<b>Lognormal GOF Test</b>											
254					Shapiro Wilk Test Statistic	0.963					<b>Shapiro Wilk Lognormal GOF Test</b>	
255					5% Shapiro Wilk Critical Value	0.788					Data appear Lognormal at 5% Significance Level	
256					Lilliefors Test Statistic	0.184					<b>Lilliefors Lognormal GOF Test</b>	
257					5% Lilliefors Critical Value	0.325					Data appear Lognormal at 5% Significance Level	
258	<b>Data appear Lognormal at 5% Significance Level</b>											
259												
260	<b>Lognormal Statistics</b>											
261					Minimum of Logged Data	1.281					Mean of logged Data	2.007
262					Maximum of Logged Data	2.565					SD of logged Data	0.433
263												
264	<b>Assuming Lognormal Distribution</b>											
265					95% H-UCL	13.22					90% Chebyshev (MVUE) UCL	12.3

	A	B	C	D	E	F	G	H	I	J	K	L
266			95% Chebyshev (MVUE) UCL			14.22			97.5% Chebyshev (MVUE) UCL			16.9
267			99% Chebyshev (MVUE) UCL			22.16						
268												
269	<b>Nonparametric Distribution Free UCL Statistics</b>											
270	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
271												
272	<b>Nonparametric Distribution Free UCLs</b>											
273			95% CLT UCL			10.12			95% Jackknife UCL			10.6
274			95% Standard Bootstrap UCL			9.93			95% Bootstrap-t UCL			11.03
275			95% Hall's Bootstrap UCL			12.46			95% Percentile Bootstrap UCL			10.03
276			95% BCA Bootstrap UCL			10.03						
277			90% Chebyshev(Mean, Sd) UCL			11.88			95% Chebyshev(Mean, Sd) UCL			13.63
278			97.5% Chebyshev(Mean, Sd) UCL			16.07			99% Chebyshev(Mean, Sd) UCL			20.85
279												
280	<b>Suggested UCL to Use</b>											
281			95% Student's-t UCL			10.6						
282												
283	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
284	Recommendations are based upon data size, data distribution, and skewness.											
285	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
286	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
287												
288												
289	<b>Barium</b>											
290												
291	<b>General Statistics</b>											
292			Total Number of Observations			6			Number of Distinct Observations			6
293									Number of Missing Observations			0
294			Minimum			60.3			Mean			153.7
295			Maximum			372			Median			130.5
296			SD			110.8			Std. Error of Mean			45.22
297			Coefficient of Variation			0.721			Skewness			2.066
298												
299	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
300	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
301	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
302	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
303												
304	<b>Normal GOF Test</b>											
305			Shapiro Wilk Test Statistic			0.731			<b>Shapiro Wilk GOF Test</b>			
306			5% Shapiro Wilk Critical Value			0.788			Data Not Normal at 5% Significance Level			
307			Lilliefors Test Statistic			0.404			<b>Lilliefors GOF Test</b>			
308			5% Lilliefors Critical Value			0.325			Data Not Normal at 5% Significance Level			
309	<b>Data Not Normal at 5% Significance Level</b>											
310												
311	<b>Assuming Normal Distribution</b>											
312	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
313			95% Student's-t UCL			244.8			95% Adjusted-CLT UCL (Chen-1995)			268.8
314									95% Modified-t UCL (Johnson-1978)			251.1
315												
316	<b>Gamma GOF Test</b>											
317			A-D Test Statistic			0.584			<b>Anderson-Darling Gamma GOF Test</b>			
318			5% A-D Critical Value			0.701			Detected data appear Gamma Distributed at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L	
319	K-S Test Statistic				0.352	<b>Kolmogorov-Smirnov Gamma GOF Test</b>							
320	5% K-S Critical Value				0.334	Data Not Gamma Distributed at 5% Significance Level							
321	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>												
322													
323	<b>Gamma Statistics</b>												
324	k hat (MLE)				3.158	k star (bias corrected MLE)				1.69			
325	Theta hat (MLE)				48.66	Theta star (bias corrected MLE)				90.92			
326	nu hat (MLE)				37.89	nu star (bias corrected)				20.28			
327	MLE Mean (bias corrected)				153.7	MLE Sd (bias corrected)				118.2			
328						Approximate Chi Square Value (0.05)				11.06			
329	Adjusted Level of Significance				0.0122	Adjusted Chi Square Value				8.707			
330													
331	<b>Assuming Gamma Distribution</b>												
332	95% Approximate Gamma UCL (use when n>=50)				281.8	95% Adjusted Gamma UCL (use when n<50)				357.9			
333													
334	<b>Lognormal GOF Test</b>												
335	Shapiro Wilk Test Statistic				0.897	<b>Shapiro Wilk Lognormal GOF Test</b>							
336	5% Shapiro Wilk Critical Value				0.788	Data appear Lognormal at 5% Significance Level							
337	Lilliefors Test Statistic				0.314	<b>Lilliefors Lognormal GOF Test</b>							
338	5% Lilliefors Critical Value				0.325	Data appear Lognormal at 5% Significance Level							
339	<b>Data appear Lognormal at 5% Significance Level</b>												
340													
341	<b>Lognormal Statistics</b>												
342	Minimum of Logged Data				4.099	Mean of logged Data				4.868			
343	Maximum of Logged Data				5.919	SD of logged Data				0.6			
344													
345	<b>Assuming Lognormal Distribution</b>												
346	95% H-UCL				338	90% Chebyshev (MVUE) UCL				260.9			
347	95% Chebyshev (MVUE) UCL				310.9	97.5% Chebyshev (MVUE) UCL				380.3			
348	99% Chebyshev (MVUE) UCL				516.5								
349													
350	<b>Nonparametric Distribution Free UCL Statistics</b>												
351	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
352													
353	<b>Nonparametric Distribution Free UCLs</b>												
354	95% CLT UCL				228	95% Jackknife UCL				244.8			
355	95% Standard Bootstrap UCL				222.6	95% Bootstrap-t UCL				370.5			
356	95% Hall's Bootstrap UCL				662.9	95% Percentile Bootstrap UCL				228.4			
357	95% BCA Bootstrap UCL				251.3								
358	90% Chebyshev(Mean, Sd) UCL				289.3	95% Chebyshev(Mean, Sd) UCL				350.8			
359	97.5% Chebyshev(Mean, Sd) UCL				436	99% Chebyshev(Mean, Sd) UCL				603.6			
360													
361	<b>Suggested UCL to Use</b>												
362	95% Adjusted Gamma UCL				357.9								
363													
364	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test												
365	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL												
366													
367	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
368	Recommendations are based upon data size, data distribution, and skewness.												
369	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
370	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
371													

	A	B	C	D	E	F	G	H	I	J	K	L		
372														
373	<b>Chromium</b>													
374														
375	<b>General Statistics</b>													
376	Total Number of Observations				6		Number of Distinct Observations				6			
377					Number of Missing Observations				0					
378	Minimum				9.3		Mean				16.58			
379	Maximum				25.7		Median				15.95			
380	SD				6.131		Std. Error of Mean				2.503			
381	Coefficient of Variation				0.37		Skewness				0.425			
382														
383	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>													
384	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>													
385	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>													
386	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>													
387														
388	<b>Normal GOF Test</b>													
389	Shapiro Wilk Test Statistic				0.965		<b>Shapiro Wilk GOF Test</b>							
390	5% Shapiro Wilk Critical Value				0.788		Data appear Normal at 5% Significance Level							
391	Lilliefors Test Statistic				0.166		<b>Lilliefors GOF Test</b>							
392	5% Lilliefors Critical Value				0.325		Data appear Normal at 5% Significance Level							
393	<b>Data appear Normal at 5% Significance Level</b>													
394														
395	<b>Assuming Normal Distribution</b>													
396	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>							
397	95% Student's-t UCL				21.63		95% Adjusted-CLT UCL (Chen-1995)				21.16			
398									95% Modified-t UCL (Johnson-1978)				21.7	
399														
400	<b>Gamma GOF Test</b>													
401	A-D Test Statistic				0.189		<b>Anderson-Darling Gamma GOF Test</b>							
402	5% A-D Critical Value				0.698		Detected data appear Gamma Distributed at 5% Significance Level							
403	K-S Test Statistic				0.161		<b>Kolmogorov-Smirnov Gamma GOF Test</b>							
404	5% K-S Critical Value				0.333		Detected data appear Gamma Distributed at 5% Significance Level							
405	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>													
406														
407	<b>Gamma Statistics</b>													
408	k hat (MLE)				8.659		k star (bias corrected MLE)				4.441			
409	Theta hat (MLE)				1.915		Theta star (bias corrected MLE)				3.734			
410	nu hat (MLE)				103.9		nu star (bias corrected)				53.29			
411	MLE Mean (bias corrected)				16.58		MLE Sd (bias corrected)				7.87			
412									Approximate Chi Square Value (0.05)				37.52	
413	Adjusted Level of Significance				0.0122		Adjusted Chi Square Value				32.8			
414														
415	<b>Assuming Gamma Distribution</b>													
416	95% Approximate Gamma UCL (use when n>=50))				23.55		95% Adjusted Gamma UCL (use when n<50)				26.94			
417														
418	<b>Lognormal GOF Test</b>													
419	Shapiro Wilk Test Statistic				0.974		<b>Shapiro Wilk Lognormal GOF Test</b>							
420	5% Shapiro Wilk Critical Value				0.788		Data appear Lognormal at 5% Significance Level							
421	Lilliefors Test Statistic				0.144		<b>Lilliefors Lognormal GOF Test</b>							
422	5% Lilliefors Critical Value				0.325		Data appear Lognormal at 5% Significance Level							
423	<b>Data appear Lognormal at 5% Significance Level</b>													
424														



	A	B	C	D	E	F	G	H	I	J	K	L
425	<b>Lognormal Statistics</b>											
426	Minimum of Logged Data				2.23		Mean of logged Data				2.75	
427	Maximum of Logged Data				3.246		SD of logged Data				0.38	
428												
429	<b>Assuming Lognormal Distribution</b>											
430	95% H-UCL				25.16		90% Chebyshev (MVUE) UCL				24.32	
431	95% Chebyshev (MVUE) UCL				27.81		97.5% Chebyshev (MVUE) UCL				32.67	
432	99% Chebyshev (MVUE) UCL				42.2							
433												
434	<b>Nonparametric Distribution Free UCL Statistics</b>											
435	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
436												
437	<b>Nonparametric Distribution Free UCLs</b>											
438	95% CLT UCL				20.7		95% Jackknife UCL				21.63	
439	95% Standard Bootstrap UCL				20.28		95% Bootstrap-t UCL				23.08	
440	95% Hall's Bootstrap UCL				23.91		95% Percentile Bootstrap UCL				20.5	
441	95% BCA Bootstrap UCL				20.32							
442	90% Chebyshev(Mean, Sd) UCL				24.09		95% Chebyshev(Mean, Sd) UCL				27.49	
443	97.5% Chebyshev(Mean, Sd) UCL				32.22		99% Chebyshev(Mean, Sd) UCL				41.49	
444												
445	<b>Suggested UCL to Use</b>											
446	95% Student's-t UCL				21.63							
447												
448	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
449	Recommendations are based upon data size, data distribution, and skewness.											
450	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
451	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
452												
453												
454	<b>Cobalt</b>											
455												
456	<b>General Statistics</b>											
457	Total Number of Observations				6		Number of Distinct Observations				6	
458							Number of Missing Observations				0	
459	Minimum				2.1		Mean				6.35	
460	Maximum				14.4		Median				4.9	
461	SD				4.43		Std. Error of Mean				1.809	
462	Coefficient of Variation				0.698		Skewness				1.454	
463												
464	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
465	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
466	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
467	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
468												
469	<b>Normal GOF Test</b>											
470	Shapiro Wilk Test Statistic				0.875		<b>Shapiro Wilk GOF Test</b>					
471	5% Shapiro Wilk Critical Value				0.788		Data appear Normal at 5% Significance Level					
472	Lilliefors Test Statistic				0.234		<b>Lilliefors GOF Test</b>					
473	5% Lilliefors Critical Value				0.325		Data appear Normal at 5% Significance Level					
474	<b>Data appear Normal at 5% Significance Level</b>											
475												
476	<b>Assuming Normal Distribution</b>											
477	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
478	95% Student's-t UCL				9.994	95% Adjusted-CLT UCL (Chen-1995)					10.47	
479						95% Modified-t UCL (Johnson-1978)					10.17	
480												
481	<b>Gamma GOF Test</b>											
482	A-D Test Statistic				0.223	Anderson-Darling Gamma GOF Test						
483	5% A-D Critical Value				0.702	Detected data appear Gamma Distributed at 5% Significance Level						
484	K-S Test Statistic				0.172	Kolmogorov-Smirnov Gamma GOF Test						
485	5% K-S Critical Value				0.335	Detected data appear Gamma Distributed at 5% Significance Level						
486	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
487												
488	<b>Gamma Statistics</b>											
489	k hat (MLE)				2.826	k star (bias corrected MLE)					1.524	
490	Theta hat (MLE)				2.247	Theta star (bias corrected MLE)					4.167	
491	nu hat (MLE)				33.91	nu star (bias corrected)					18.29	
492	MLE Mean (bias corrected)				6.35	MLE Sd (bias corrected)					5.144	
493						Approximate Chi Square Value (0.05)					9.599	
494	Adjusted Level of Significance				0.0122	Adjusted Chi Square Value					7.438	
495												
496	<b>Assuming Gamma Distribution</b>											
497	95% Approximate Gamma UCL (use when n>=50))				12.1	95% Adjusted Gamma UCL (use when n<50)					15.61	
498												
499	<b>Lognormal GOF Test</b>											
500	Shapiro Wilk Test Statistic				0.99	Shapiro Wilk Lognormal GOF Test						
501	5% Shapiro Wilk Critical Value				0.788	Data appear Lognormal at 5% Significance Level						
502	Lilliefors Test Statistic				0.133	Lilliefors Lognormal GOF Test						
503	5% Lilliefors Critical Value				0.325	Data appear Lognormal at 5% Significance Level						
504	<b>Data appear Lognormal at 5% Significance Level</b>											
505												
506	<b>Lognormal Statistics</b>											
507	Minimum of Logged Data				0.742	Mean of logged Data					1.661	
508	Maximum of Logged Data				2.667	SD of logged Data					0.667	
509												
510	<b>Assuming Lognormal Distribution</b>											
511	95% H-UCL				16.45	90% Chebyshev (MVUE) UCL					11.44	
512	95% Chebyshev (MVUE) UCL				13.76	97.5% Chebyshev (MVUE) UCL					16.98	
513	99% Chebyshev (MVUE) UCL				23.32							
514												
515	<b>Nonparametric Distribution Free UCL Statistics</b>											
516	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
517												
518	<b>Nonparametric Distribution Free UCLs</b>											
519	95% CLT UCL				9.325	95% Jackknife UCL					9.994	
520	95% Standard Bootstrap UCL				9.047	95% Bootstrap-t UCL					15.14	
521	95% Hall's Bootstrap UCL				26.8	95% Percentile Bootstrap UCL					9.2	
522	95% BCA Bootstrap UCL				9.95							
523	90% Chebyshev(Mean, Sd) UCL				11.78	95% Chebyshev(Mean, Sd) UCL					14.23	
524	97.5% Chebyshev(Mean, Sd) UCL				17.64	99% Chebyshev(Mean, Sd) UCL					24.35	
525												
526	<b>Suggested UCL to Use</b>											
527	95% Student's-t UCL				9.994							
528												
529	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
530	Recommendations are based upon data size, data distribution, and skewness.											

	A	B	C	D	E	F	G	H	I	J	K	L	
531	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
532	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
533													
534													
535	<b>Copper</b>												
536													
537	<b>General Statistics</b>												
538	Total Number of Observations				6		Number of Distinct Observations				6		
539									Number of Missing Observations				0
540	Minimum				30.8		Mean				58.82		
541	Maximum				105		Median				58.75		
542	SD				25.96		Std. Error of Mean				10.6		
543	Coefficient of Variation				0.441		Skewness				1.154		
544													
545	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>												
546	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>												
547	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>												
548	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>												
549													
550	<b>Normal GOF Test</b>												
551	Shapiro Wilk Test Statistic				0.882		<b>Shapiro Wilk GOF Test</b>						
552	5% Shapiro Wilk Critical Value				0.788		Data appear Normal at 5% Significance Level						
553	Lilliefors Test Statistic				0.288		<b>Lilliefors GOF Test</b>						
554	5% Lilliefors Critical Value				0.325		Data appear Normal at 5% Significance Level						
555	<b>Data appear Normal at 5% Significance Level</b>												
556													
557	<b>Assuming Normal Distribution</b>												
558	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
559	95% Student's-t UCL				80.17		95% Adjusted-CLT UCL (Chen-1995)				81.58		
560									95% Modified-t UCL (Johnson-1978)				81
561													
562	<b>Gamma GOF Test</b>												
563	A-D Test Statistic				0.358		<b>Anderson-Darling Gamma GOF Test</b>						
564	5% A-D Critical Value				0.698		Detected data appear Gamma Distributed at 5% Significance Level						
565	K-S Test Statistic				0.232		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
566	5% K-S Critical Value				0.333		Detected data appear Gamma Distributed at 5% Significance Level						
567	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
568													
569	<b>Gamma Statistics</b>												
570	k hat (MLE)				6.652		k star (bias corrected MLE)				3.437		
571	Theta hat (MLE)				8.843		Theta star (bias corrected MLE)				17.11		
572	nu hat (MLE)				79.82		nu star (bias corrected)				41.24		
573	MLE Mean (bias corrected)				58.82		MLE Sd (bias corrected)				31.73		
574									Approximate Chi Square Value (0.05)				27.52
575	Adjusted Level of Significance				0.0122		Adjusted Chi Square Value				23.56		
576													
577	<b>Assuming Gamma Distribution</b>												
578	95% Approximate Gamma UCL (use when n>=50))				88.13		95% Adjusted Gamma UCL (use when n<50)				103		
579													
580	<b>Lognormal GOF Test</b>												
581	Shapiro Wilk Test Statistic				0.938		<b>Shapiro Wilk Lognormal GOF Test</b>						
582	5% Shapiro Wilk Critical Value				0.788		Data appear Lognormal at 5% Significance Level						
583	Lilliefors Test Statistic				0.233		<b>Lilliefors Lognormal GOF Test</b>						

	A	B	C	D	E	F	G	H	I	J	K	L	
584	5% Lilliefors Critical Value				0.325	Data appear Lognormal at 5% Significance Level							
585	<b>Data appear Lognormal at 5% Significance Level</b>												
586													
587	<b>Lognormal Statistics</b>												
588	Minimum of Logged Data				3.428	Mean of logged Data				3.997			
589	Maximum of Logged Data				4.654	SD of logged Data				0.428			
590													
591	<b>Assuming Lognormal Distribution</b>												
592	95% H-UCL				95.86	90% Chebyshev (MVUE) UCL				89.51			
593	95% Chebyshev (MVUE) UCL				103.4	97.5% Chebyshev (MVUE) UCL				122.8			
594	99% Chebyshev (MVUE) UCL				160.8								
595													
596	<b>Nonparametric Distribution Free UCL Statistics</b>												
597	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
598													
599	<b>Nonparametric Distribution Free UCLs</b>												
600	95% CLT UCL				76.25	95% Jackknife UCL				80.17			
601	95% Standard Bootstrap UCL				75.06	95% Bootstrap-t UCL				86.22			
602	95% Hall's Bootstrap UCL				148.7	95% Percentile Bootstrap UCL				74.93			
603	95% BCA Bootstrap UCL				78.93								
604	90% Chebyshev(Mean, Sd) UCL				90.61	95% Chebyshev(Mean, Sd) UCL				105			
605	97.5% Chebyshev(Mean, Sd) UCL				125	99% Chebyshev(Mean, Sd) UCL				164.3			
606													
607	<b>Suggested UCL to Use</b>												
608	95% Student's-t UCL				80.17								
609													
610	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
611	Recommendations are based upon data size, data distribution, and skewness.												
612	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
613	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
614													
615													
616	<b>Lead</b>												
617													
618	<b>General Statistics</b>												
619	Total Number of Observations				6	Number of Distinct Observations				6			
620						Number of Missing Observations				0			
621	Minimum				9.1	Mean				754.7			
622	Maximum				3710	Median				180.5			
623	SD				1455	Std. Error of Mean				594.1			
624	Coefficient of Variation				1.928	Skewness				2.394			
625													
626	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>												
627	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>												
628	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>												
629	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>												
630													
631	<b>Normal GOF Test</b>												
632	Shapiro Wilk Test Statistic				0.588	<b>Shapiro Wilk GOF Test</b>							
633	5% Shapiro Wilk Critical Value				0.788	Data Not Normal at 5% Significance Level							
634	Lilliefors Test Statistic				0.427	<b>Lilliefors GOF Test</b>							
635	5% Lilliefors Critical Value				0.325	Data Not Normal at 5% Significance Level							
636	<b>Data Not Normal at 5% Significance Level</b>												

	A	B	C	D	E	F	G	H	I	J	K	L	
637													
638	<b>Assuming Normal Distribution</b>												
639	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
640	95% Student's-t UCL					1952		95% Adjusted-CLT UCL (Chen-1995)					2352
641								95% Modified-t UCL (Johnson-1978)					2049
642													
643	<b>Gamma GOF Test</b>												
644	A-D Test Statistic				0.402		<b>Anderson-Darling Gamma GOF Test</b>						
645	5% A-D Critical Value				0.749		Detected data appear Gamma Distributed at 5% Significance Level						
646	K-S Test Statistic				0.265		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
647	5% K-S Critical Value				0.352		Detected data appear Gamma Distributed at 5% Significance Level						
648	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
649													
650	<b>Gamma Statistics</b>												
651	k hat (MLE)				0.417		k star (bias corrected MLE)				0.32		
652	Theta hat (MLE)				1808		Theta star (bias corrected MLE)				2360		
653	nu hat (MLE)				5.009		nu star (bias corrected)				3.838		
654	MLE Mean (bias corrected)				754.7		MLE Sd (bias corrected)				1334		
655							Approximate Chi Square Value (0.05)				0.659		
656	Adjusted Level of Significance				0.0122		Adjusted Chi Square Value				0.316		
657													
658	<b>Assuming Gamma Distribution</b>												
659	95% Approximate Gamma UCL (use when n>=50)				4397		95% Adjusted Gamma UCL (use when n<50)				9173		
660													
661	<b>Lognormal GOF Test</b>												
662	Shapiro Wilk Test Statistic				0.991		<b>Shapiro Wilk Lognormal GOF Test</b>						
663	5% Shapiro Wilk Critical Value				0.788		Data appear Lognormal at 5% Significance Level						
664	Lilliefors Test Statistic				0.155		<b>Lilliefors Lognormal GOF Test</b>						
665	5% Lilliefors Critical Value				0.325		Data appear Lognormal at 5% Significance Level						
666	<b>Data appear Lognormal at 5% Significance Level</b>												
667													
668	<b>Lognormal Statistics</b>												
669	Minimum of Logged Data				2.208		Mean of logged Data				5.06		
670	Maximum of Logged Data				8.219		SD of logged Data				2.062		
671													
672	<b>Assuming Lognormal Distribution</b>												
673	95% H-UCL				1975392		90% Chebyshev (MVUE) UCL				2185		
674	95% Chebyshev (MVUE) UCL				2865		97.5% Chebyshev (MVUE) UCL				3808		
675	99% Chebyshev (MVUE) UCL				5660								
676													
677	<b>Nonparametric Distribution Free UCL Statistics</b>												
678	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>												
679													
680	<b>Nonparametric Distribution Free UCLs</b>												
681	95% CLT UCL				1732		95% Jackknife UCL				1952		
682	95% Standard Bootstrap UCL				1670		95% Bootstrap-t UCL				11488		
683	95% Hall's Bootstrap UCL				7367		95% Percentile Bootstrap UCL				1903		
684	95% BCA Bootstrap UCL				2011								
685	90% Chebyshev(Mean, Sd) UCL				2537		95% Chebyshev(Mean, Sd) UCL				3344		
686	97.5% Chebyshev(Mean, Sd) UCL				4465		99% Chebyshev(Mean, Sd) UCL				6666		
687													
688	<b>Suggested UCL to Use</b>												
689	95% Adjusted Gamma UCL				9173								

	A	B	C	D	E	F	G	H	I	J	K	L		
690														
691	<b>Recommended UCL exceeds the maximum observation</b>													
692														
693	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.													
694	Recommendations are based upon data size, data distribution, and skewness.													
695	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).													
696	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.													
697														
698														
699	<b>Manganese</b>													
700														
701	<b>General Statistics</b>													
702	Total Number of Observations				6		Number of Distinct Observations				6			
703					Number of Missing Observations				0					
704	Minimum				336		Mean				764.5			
705	Maximum				2280		Median				479.5			
706	SD				753.4		Std. Error of Mean				307.6			
707	Coefficient of Variation				0.986		Skewness				2.295			
708														
709	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>													
710	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>													
711	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>													
712	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>													
713														
714	<b>Normal GOF Test</b>													
715	Shapiro Wilk Test Statistic				0.642		<b>Shapiro Wilk GOF Test</b>							
716	5% Shapiro Wilk Critical Value				0.788		Data Not Normal at 5% Significance Level							
717	Lilliefors Test Statistic				0.392		<b>Lilliefors GOF Test</b>							
718	5% Lilliefors Critical Value				0.325		Data Not Normal at 5% Significance Level							
719	<b>Data Not Normal at 5% Significance Level</b>													
720														
721	<b>Assuming Normal Distribution</b>													
722	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>							
723	95% Student's-t UCL				1384		95% Adjusted-CLT UCL (Chen-1995)				1578			
724									95% Modified-t UCL (Johnson-1978)				1432	
725														
726	<b>Gamma GOF Test</b>													
727	A-D Test Statistic				0.808		<b>Anderson-Darling Gamma GOF Test</b>							
728	5% A-D Critical Value				0.704		Data Not Gamma Distributed at 5% Significance Level							
729	K-S Test Statistic				0.324		<b>Kolmogorov-Smirnov Gamma GOF Test</b>							
730	5% K-S Critical Value				0.336		Detected data appear Gamma Distributed at 5% Significance Level							
731	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>													
732														
733	<b>Gamma Statistics</b>													
734	k hat (MLE)				2.006		k star (bias corrected MLE)				1.114			
735	Theta hat (MLE)				381.2		Theta star (bias corrected MLE)				686.3			
736	nu hat (MLE)				24.07		nu star (bias corrected)				13.37			
737	MLE Mean (bias corrected)				764.5		MLE Sd (bias corrected)				724.3			
738									Approximate Chi Square Value (0.05)				6.141	
739	Adjusted Level of Significance				0.0122		Adjusted Chi Square Value				4.492			
740														
741	<b>Assuming Gamma Distribution</b>													
742	95% Approximate Gamma UCL (use when n>=50)				1664		95% Adjusted Gamma UCL (use when n<50)				2275			

	A	B	C	D	E	F	G	H	I	J	K	L
743												
744	<b>Lognormal GOF Test</b>											
745	Shapiro Wilk Test Statistic					0.796	<b>Shapiro Wilk Lognormal GOF Test</b>					
746	5% Shapiro Wilk Critical Value					0.788	Data appear Lognormal at 5% Significance Level					
747	Lilliefors Test Statistic					0.272	<b>Lilliefors Lognormal GOF Test</b>					
748	5% Lilliefors Critical Value					0.325	Data appear Lognormal at 5% Significance Level					
749	<b>Data appear Lognormal at 5% Significance Level</b>											
750												
751	<b>Lognormal Statistics</b>											
752	Minimum of Logged Data					5.817	Mean of logged Data					6.37
753	Maximum of Logged Data					7.732	SD of logged Data					0.719
754												
755	<b>Assuming Lognormal Distribution</b>											
756	95% H-UCL					2138	90% Chebyshev (MVUE) UCL					1351
757	95% Chebyshev (MVUE) UCL					1637	97.5% Chebyshev (MVUE) UCL					2033
758	99% Chebyshev (MVUE) UCL					2813						
759												
760	<b>Nonparametric Distribution Free UCL Statistics</b>											
761	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
762												
763	<b>Nonparametric Distribution Free UCLs</b>											
764	95% CLT UCL					1270	95% Jackknife UCL					1384
765	95% Standard Bootstrap UCL					1227	95% Bootstrap-t UCL					3110
766	95% Hall's Bootstrap UCL					3730	95% Percentile Bootstrap UCL					1312
767	95% BCA Bootstrap UCL					1441						
768	90% Chebyshev(Mean, Sd) UCL					1687	95% Chebyshev(Mean, Sd) UCL					2105
769	97.5% Chebyshev(Mean, Sd) UCL					2685	99% Chebyshev(Mean, Sd) UCL					3825
770												
771	<b>Suggested UCL to Use</b>											
772	95% Adjusted Gamma UCL					2275						
773												
774	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
775	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
776												
777	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
778	Recommendations are based upon data size, data distribution, and skewness.											
779	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
780	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
781												
782												
783	<b>Mercury</b>											
784												
785	<b>General Statistics</b>											
786	Total Number of Observations					6	Number of Distinct Observations					6
787							Number of Missing Observations					0
788	Minimum					0.033	Mean					0.267
789	Maximum					0.821	Median					0.221
790	SD					0.288	Std. Error of Mean					0.118
791	Coefficient of Variation					1.082	Skewness					1.833
792												
793	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
794	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
795	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
796	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
797												
798	<b>Normal GOF Test</b>											
799	Shapiro Wilk Test Statistic				0.777	<b>Shapiro Wilk GOF Test</b>						
800	5% Shapiro Wilk Critical Value				0.788	Data Not Normal at 5% Significance Level						
801	Lilliefors Test Statistic				0.344	<b>Lilliefors GOF Test</b>						
802	5% Lilliefors Critical Value				0.325	Data Not Normal at 5% Significance Level						
803	<b>Data Not Normal at 5% Significance Level</b>											
804												
805	<b>Assuming Normal Distribution</b>											
806	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
807	95% Student's-t UCL				0.504	95% Adjusted-CLT UCL (Chen-1995)				0.554		
808						95% Modified-t UCL (Johnson-1978)				0.518		
809												
810	<b>Gamma GOF Test</b>											
811	A-D Test Statistic				0.387	<b>Anderson-Darling Gamma GOF Test</b>						
812	5% A-D Critical Value				0.714	Detected data appear Gamma Distributed at 5% Significance Level						
813	K-S Test Statistic				0.217	<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
814	5% K-S Critical Value				0.34	Detected data appear Gamma Distributed at 5% Significance Level						
815	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
816												
817	<b>Gamma Statistics</b>											
818	k hat (MLE)				1.083	k star (bias corrected MLE)				0.653		
819	Theta hat (MLE)				0.246	Theta star (bias corrected MLE)				0.408		
820	nu hat (MLE)				12.99	nu star (bias corrected)				7.831		
821	MLE Mean (bias corrected)				0.267	MLE Sd (bias corrected)				0.33		
822						Approximate Chi Square Value (0.05)				2.637		
823	Adjusted Level of Significance				0.0122	Adjusted Chi Square Value				1.68		
824												
825	<b>Assuming Gamma Distribution</b>											
826	95% Approximate Gamma UCL (use when n>=50)				0.791	95% Adjusted Gamma UCL (use when n<50)				1.242		
827												
828	<b>Lognormal GOF Test</b>											
829	Shapiro Wilk Test Statistic				0.909	<b>Shapiro Wilk Lognormal GOF Test</b>						
830	5% Shapiro Wilk Critical Value				0.788	Data appear Lognormal at 5% Significance Level						
831	Lilliefors Test Statistic				0.266	<b>Lilliefors Lognormal GOF Test</b>						
832	5% Lilliefors Critical Value				0.325	Data appear Lognormal at 5% Significance Level						
833	<b>Data appear Lognormal at 5% Significance Level</b>											
834												
835	<b>Lognormal Statistics</b>											
836	Minimum of Logged Data				-3.411	Mean of logged Data				-1.851		
837	Maximum of Logged Data				-0.197	SD of logged Data				1.206		
838												
839	<b>Assuming Lognormal Distribution</b>											
840	95% H-UCL				4.43	90% Chebyshev (MVUE) UCL				0.67		
841	95% Chebyshev (MVUE) UCL				0.849	97.5% Chebyshev (MVUE) UCL				1.097		
842	99% Chebyshev (MVUE) UCL				1.584							
843												
844	<b>Nonparametric Distribution Free UCL Statistics</b>											
845	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
846												
847	<b>Nonparametric Distribution Free UCLs</b>											
848	95% CLT UCL				0.46	95% Jackknife UCL				0.504		



	A	B	C	D	E	F	G	H	I	J	K	L
849	95% Standard Bootstrap UCL					0.445	95% Bootstrap-t UCL					0.698
850	95% Hall's Bootstrap UCL					1.305	95% Percentile Bootstrap UCL					0.462
851	95% BCA Bootstrap UCL					0.497						
852	90% Chebyshev(Mean, Sd) UCL					0.62	95% Chebyshev(Mean, Sd) UCL					0.78
853	97.5% Chebyshev(Mean, Sd) UCL					1.002	99% Chebyshev(Mean, Sd) UCL					1.438
854												
855	<b>Suggested UCL to Use</b>											
856	95% Adjusted Gamma UCL					1.242						
857												
858	<b>Recommended UCL exceeds the maximum observation</b>											
859												
860	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
861	Recommendations are based upon data size, data distribution, and skewness.											
862	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
863	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
864												
865	<b>Thallium</b>											
866												
867	<b>General Statistics</b>											
868	Total Number of Observations					6	Number of Distinct Observations					3
869	Number of Detects					2	Number of Non-Detects					4
870	Number of Distinct Detects					2	Number of Distinct Non-Detects					1
871	Minimum Detect					0.8	Minimum Non-Detect					1.1
872	Maximum Detect					3.5	Maximum Non-Detect					1.1
873	Variance Detects					3.645	Percent Non-Detects					66.67%
874	Mean Detects					2.15	SD Detects					1.909
875	Median Detects					2.15	CV Detects					0.888
876	Skewness Detects					N/A	Kurtosis Detects					N/A
877	Mean of Logged Detects					0.515	SD of Logged Detects					1.044
878												
879	<b>Warning: Data set has only 2 Detected Values.</b>											
880	<b>This is not enough to compute meaningful or reliable statistics and estimates.</b>											
881												
882												
883	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
884	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
885	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
886	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
887												
888	<b>Normal GOF Test on Detects Only</b>											
889	<b>Not Enough Data to Perform GOF Test</b>											
890												
891	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
892	KM Mean					1.25	KM Standard Error of Mean					0.581
893	KM SD					1.006	95% KM (BCA) UCL					N/A
894	95% KM (t) UCL					2.421	95% KM (Percentile Bootstrap) UCL					N/A
895	95% KM (z) UCL					2.206	95% KM Bootstrap t UCL					N/A
896	90% KM Chebyshev UCL					2.993	95% KM Chebyshev UCL					3.782
897	97.5% KM Chebyshev UCL					4.878	99% KM Chebyshev UCL					7.03
898												
899	<b>Gamma GOF Tests on Detected Observations Only</b>											
900	<b>Not Enough Data to Perform GOF Test</b>											
901												

	A	B	C	D	E	F	G	H	I	J	K	L
902	<b>Gamma Statistics on Detected Data Only</b>											
903					k hat (MLE)	2.147				k star (bias corrected MLE)		N/A
904					Theta hat (MLE)	1.002				Theta star (bias corrected MLE)		N/A
905					nu hat (MLE)	8.586				nu star (bias corrected)		N/A
906					Mean (detects)	2.15						
907												
908	<b>Estimates of Gamma Parameters using KM Estimates</b>											
909					Mean (KM)	1.25				SD (KM)		1.006
910					Variance (KM)	1.013				SE of Mean (KM)		0.581
911					k hat (KM)	1.543				k star (KM)		0.883
912					nu hat (KM)	18.52				nu star (KM)		10.59
913					theta hat (KM)	0.81				theta star (KM)		1.416
914					80% gamma percentile (KM)	2.031				90% gamma percentile (KM)		2.968
915					95% gamma percentile (KM)	3.914				99% gamma percentile (KM)		6.133
916												
917	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
918										Adjusted Level of Significance ( $\beta$ )		0.0122
919					Approximate Chi Square Value (10.59, $\alpha$ )	4.315				Adjusted Chi Square Value (10.59, $\beta$ )		2.994
920					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	3.068				95% Gamma Adjusted KM-UCL (use when $n < 50$ )		4.422
921												
922	<b>Lognormal GOF Test on Detected Observations Only</b>											
923	<b>Not Enough Data to Perform GOF Test</b>											
924												
925	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
926					Mean in Original Scale	1.295				Mean in Log Scale		0.00343
927					SD in Original Scale	1.136				SD in Log Scale		0.748
928					95% t UCL (assumes normality of ROS data)	2.23				95% Percentile Bootstrap UCL		2.058
929					95% BCA Bootstrap UCL	2.258				95% Bootstrap t UCL		4.481
930					95% H-UCL (Log ROS)	4.018						
931												
932	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
933					KM Mean (logged)	0.0228				KM Geo Mean		1.023
934					KM SD (logged)	0.55				95% Critical H Value (KM-Log)		2.761
935					KM Standard Error of Mean (logged)	0.318				95% H-UCL (KM -Log)		2.347
936					KM SD (logged)	0.55				95% Critical H Value (KM-Log)		2.761
937					KM Standard Error of Mean (logged)	0.318						
938												
939	<b>DL/2 Statistics</b>											
940	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
941					Mean in Original Scale	1.083				Mean in Log Scale		-0.227
942					SD in Original Scale	1.188				SD in Log Scale		0.74
943					95% t UCL (Assumes normality)	2.061				95% H-Stat UCL		3.117
944	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
945												
946	<b>Nonparametric Distribution Free UCL Statistics</b>											
947	<b>Data do not follow a Discernible Distribution at 5% Significance Level</b>											
948												
949	<b>Suggested UCL to Use</b>											
950					95% KM (Chebyshev) UCL	3.782						
951	<b>Warning: Recommended UCL exceeds the maximum observation</b>											
952												
953	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
954	Recommendations are based upon data size, data distribution, and skewness.											

	A	B	C	D	E	F	G	H	I	J	K	L
955	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
956	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
957												
958	<b>Benzo(a)anthracene</b>											
959												
960	<b>General Statistics</b>											
961	Total Number of Observations				6		Number of Distinct Observations				6	
962	Number of Detects				5		Number of Non-Detects				1	
963	Number of Distinct Detects				5		Number of Distinct Non-Detects				1	
964	Minimum Detect				0.15		Minimum Non-Detect				0.37	
965	Maximum Detect				29		Maximum Non-Detect				0.37	
966	Variance Detects				148.1		Percent Non-Detects				16.67%	
967	Mean Detects				7.41		SD Detects				12.17	
968	Median Detects				2.3		CV Detects				1.643	
969	Skewness Detects				2.145		Kurtosis Detects				4.662	
970	Mean of Logged Detects				0.793		SD of Logged Detects				1.918	
971												
972	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
973	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
974	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
975	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
976												
977	<b>Normal GOF Test on Detects Only</b>											
978	Shapiro Wilk Test Statistic				0.671		<b>Shapiro Wilk GOF Test</b>					
979	5% Shapiro Wilk Critical Value				0.762		Detected Data Not Normal at 5% Significance Level					
980	Lilliefors Test Statistic				0.398		<b>Lilliefors GOF Test</b>					
981	5% Lilliefors Critical Value				0.343		Detected Data Not Normal at 5% Significance Level					
982	<b>Detected Data Not Normal at 5% Significance Level</b>											
983												
984	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
985	KM Mean				6.2		KM Standard Error of Mean				4.701	
986	KM SD				10.3		95% KM (BCA) UCL				14.75	
987	95% KM (t) UCL				15.67		95% KM (Percentile Bootstrap) UCL				14.93	
988	95% KM (z) UCL				13.93		95% KM Bootstrap t UCL				66.43	
989	90% KM Chebyshev UCL				20.3		95% KM Chebyshev UCL				26.69	
990	97.5% KM Chebyshev UCL				35.56		99% KM Chebyshev UCL				52.98	
991												
992	<b>Gamma GOF Tests on Detected Observations Only</b>											
993	A-D Test Statistic				0.303		<b>Anderson-Darling GOF Test</b>					
994	5% A-D Critical Value				0.71		Detected data appear Gamma Distributed at 5% Significance Level					
995	K-S Test Statistic				0.248		<b>Kolmogorov-Smirnov GOF</b>					
996	5% K-S Critical Value				0.371		Detected data appear Gamma Distributed at 5% Significance Level					
997	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
998												
999	<b>Gamma Statistics on Detected Data Only</b>											
1000	k hat (MLE)				0.522		k star (bias corrected MLE)				0.342	
1001	Theta hat (MLE)				14.2		Theta star (bias corrected MLE)				21.66	
1002	nu hat (MLE)				5.218		nu star (bias corrected)				3.42	
1003	Mean (detects)				7.41							
1004												
1005	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1006	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1007	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											

	A	B	C	D	E	F	G	H	I	J	K	L
1008	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1009	This is especially true when the sample size is small.											
1010	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1011	Minimum				0.01		Mean				6.177	
1012	Maximum				29		Median				1.75	
1013	SD				11.3		CV				1.829	
1014	k hat (MLE)				0.349		k star (bias corrected MLE)				0.286	
1015	Theta hat (MLE)				17.69		Theta star (bias corrected MLE)				21.62	
1016	nu hat (MLE)				4.189		nu star (bias corrected)				3.428	
1017	Adjusted Level of Significance ( $\beta$ )				0.0122							
1018	Approximate Chi Square Value (3.43, $\alpha$ )				0.51		Adjusted Chi Square Value (3.43, $\beta$ )				0.235	
1019	95% Gamma Approximate UCL (use when $n \geq 50$ )				41.54		95% Gamma Adjusted UCL (use when $n < 50$ )				90.22	
1020												
1021	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1022	Mean (KM)				6.2		SD (KM)				10.3	
1023	Variance (KM)				106.1		SE of Mean (KM)				4.701	
1024	k hat (KM)				0.362		k star (KM)				0.292	
1025	nu hat (KM)				4.348		nu star (KM)				3.507	
1026	theta hat (KM)				17.11		theta star (KM)				21.21	
1027	80% gamma percentile (KM)				9.446		90% gamma percentile (KM)				18.34	
1028	95% gamma percentile (KM)				28.6		99% gamma percentile (KM)				55.34	
1029												
1030	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1031	Approximate Chi Square Value (3.51, $\alpha$ )				0.537		Adjusted Chi Square Value (3.51, $\beta$ )				0.249	
1032	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				40.47		95% Gamma Adjusted KM-UCL (use when $n < 50$ )				87.25	
1033												
1034	<b>Lognormal GOF Test on Detected Observations Only</b>											
1035	Shapiro Wilk Test Statistic				0.988		<b>Shapiro Wilk GOF Test</b>					
1036	5% Shapiro Wilk Critical Value				0.762		Detected Data appear Lognormal at 5% Significance Level					
1037	Lilliefors Test Statistic				0.175		<b>Lilliefors GOF Test</b>					
1038	5% Lilliefors Critical Value				0.343		Detected Data appear Lognormal at 5% Significance Level					
1039	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1040												
1041	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1042	Mean in Original Scale				6.197		Mean in Log Scale				0.327	
1043	SD in Original Scale				11.28		SD in Log Scale				2.061	
1044	95% t UCL (assumes normality of ROS data)				15.48		95% Percentile Bootstrap UCL				14.93	
1045	95% BCA Bootstrap UCL				15.99		95% Bootstrap t UCL				65.34	
1046	95% H-UCL (Log ROS)				17316							
1047												
1048	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1049	KM Mean (logged)				0.345		KM Geo Mean				1.412	
1050	KM SD (logged)				1.859		95% Critical H Value (KM-Log)				7.185	
1051	KM Standard Error of Mean (logged)				0.849		95% H-UCL (KM -Log)				3130	
1052	KM SD (logged)				1.859		95% Critical H Value (KM-Log)				7.185	
1053	KM Standard Error of Mean (logged)				0.849							
1054												
1055	<b>DL/2 Statistics</b>											
1056	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1057	Mean in Original Scale				6.206		Mean in Log Scale				0.38	
1058	SD in Original Scale				11.28		SD in Log Scale				1.992	
1059	95% t UCL (Assumes normality)				15.48		95% H-Stat UCL				9883	
1060	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1061												
1062	<b>Nonparametric Distribution Free UCL Statistics</b>											
1063	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1064												
1065	<b>Suggested UCL to Use</b>											
1066	95% KM Bootstrap t UCL				66.43		Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				87.25	
1067												
1068	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1069	Recommendations are based upon data size, data distribution, and skewness.											
1070	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1071	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1072												
1073	<b>Benzo(b)fluoranthene</b>											
1074												
1075	<b>General Statistics</b>											
1076	Total Number of Observations				6		Number of Distinct Observations				6	
1077	Number of Detects				5		Number of Non-Detects				1	
1078	Number of Distinct Detects				5		Number of Distinct Non-Detects				1	
1079	Minimum Detect				0.22		Minimum Non-Detect				0.37	
1080	Maximum Detect				30		Maximum Non-Detect				0.37	
1081	Variance Detects				156.6		Percent Non-Detects				16.67%	
1082	Mean Detects				7.784		SD Detects				12.52	
1083	Median Detects				3		CV Detects				1.608	
1084	Skewness Detects				2.151		Kurtosis Detects				4.696	
1085	Mean of Logged Detects				0.956		SD of Logged Detects				1.784	
1086												
1087	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1088	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1089	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1090	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1091												
1092	<b>Normal GOF Test on Detects Only</b>											
1093	Shapiro Wilk Test Statistic				0.67		<b>Shapiro Wilk GOF Test</b>					
1094	5% Shapiro Wilk Critical Value				0.762		Detected Data Not Normal at 5% Significance Level					
1095	Lilliefors Test Statistic				0.41		<b>Lilliefors GOF Test</b>					
1096	5% Lilliefors Critical Value				0.343		Detected Data Not Normal at 5% Significance Level					
1097	<b>Detected Data Not Normal at 5% Significance Level</b>											
1098												
1099	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1100	KM Mean				6.523		KM Standard Error of Mean				4.838	
1101	KM SD				10.6		95% KM (BCA) UCL				15.84	
1102	95% KM (t) UCL				16.27		95% KM (Percentile Bootstrap) UCL				15.53	
1103	95% KM (z) UCL				14.48		95% KM Bootstrap t UCL				51.59	
1104	90% KM Chebyshev UCL				21.04		95% KM Chebyshev UCL				27.61	
1105	97.5% KM Chebyshev UCL				36.74		99% KM Chebyshev UCL				54.67	
1106												
1107	<b>Gamma GOF Tests on Detected Observations Only</b>											
1108	A-D Test Statistic				0.333		<b>Anderson-Darling GOF Test</b>					
1109	5% A-D Critical Value				0.707		Detected data appear Gamma Distributed at 5% Significance Level					
1110	K-S Test Statistic				0.279		<b>Kolmogorov-Smirnov GOF</b>					
1111	5% K-S Critical Value				0.37		Detected data appear Gamma Distributed at 5% Significance Level					
1112	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1113												

	A	B	C	D	E	F	G	H	I	J	K	L	
1114	<b>Gamma Statistics on Detected Data Only</b>												
1115	k hat (MLE)				0.568	k star (bias corrected MLE)				0.361			
1116	Theta hat (MLE)				13.7	Theta star (bias corrected MLE)				21.58			
1117	nu hat (MLE)				5.684	nu star (bias corrected)				3.607			
1118	Mean (detects)				7.784								
1119													
1120	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
1121	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1122	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1123	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1124	This is especially true when the sample size is small.												
1125	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1126	Minimum				0.01	Mean				6.488			
1127	Maximum				30	Median				2.2			
1128	SD				11.64	CV				1.793			
1129	k hat (MLE)				0.363	k star (bias corrected MLE)				0.293			
1130	Theta hat (MLE)				17.87	Theta star (bias corrected MLE)				22.17			
1131	nu hat (MLE)				4.358	nu star (bias corrected)				3.512			
1132	Adjusted Level of Significance ( $\beta$ )				0.0122								
1133	Approximate Chi Square Value (3.51, $\alpha$ )				0.539	Adjusted Chi Square Value (3.51, $\beta$ )				0.25			
1134	95% Gamma Approximate UCL (use when $n \geq 50$ )				42.28	95% Gamma Adjusted UCL (use when $n < 50$ )				91.12			
1135													
1136	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1137	Mean (KM)				6.523	SD (KM)				10.6			
1138	Variance (KM)				112.4	SE of Mean (KM)				4.838			
1139	k hat (KM)				0.379	k star (KM)				0.3			
1140	nu hat (KM)				4.544	nu star (KM)				3.605			
1141	theta hat (KM)				17.23	theta star (KM)				21.71			
1142	80% gamma percentile (KM)				10.01	90% gamma percentile (KM)				19.24			
1143	95% gamma percentile (KM)				29.83	99% gamma percentile (KM)				57.34			
1144													
1145	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1146	Approximate Chi Square Value (3.61, $\alpha$ )				0.572	Adjusted Chi Square Value (3.61, $\beta$ )				0.268			
1147	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				41.09	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				87.78			
1148													
1149	<b>Lognormal GOF Test on Detected Observations Only</b>												
1150	Shapiro Wilk Test Statistic				0.982	<b>Shapiro Wilk GOF Test</b>							
1151	5% Shapiro Wilk Critical Value				0.762	Detected Data appear Lognormal at 5% Significance Level							
1152	Lilliefors Test Statistic				0.189	<b>Lilliefors GOF Test</b>							
1153	5% Lilliefors Critical Value				0.343	Detected Data appear Lognormal at 5% Significance Level							
1154	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
1155													
1156	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1157	Mean in Original Scale				6.519	Mean in Log Scale				0.524			
1158	SD in Original Scale				11.61	SD in Log Scale				1.915			
1159	95% t UCL (assumes normality of ROS data)				16.07	95% Percentile Bootstrap UCL				15.57			
1160	95% BCA Bootstrap UCL				17.15	95% Bootstrap t UCL				63.39			
1161	95% H-UCL (Log ROS)				5909								
1162													
1163	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1164	KM Mean (logged)				0.544	KM Geo Mean				1.724			
1165	KM SD (logged)				1.723	95% Critical H Value (KM-Log)				6.689			
1166	KM Standard Error of Mean (logged)				0.787	95% H-UCL (KM -Log)				1320			

	A	B	C	D	E	F	G	H	I	J	K	L
1167					KM SD (logged)	1.723					95% Critical H Value (KM-Log)	6.689
1168					KM Standard Error of Mean (logged)	0.787						
1169												
1170					<b>DL/2 Statistics</b>							
1171					<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>		
1172					Mean in Original Scale	6.518				Mean in Log Scale	0.516	
1173					SD in Original Scale	11.62				SD in Log Scale	1.927	
1174					95% t UCL (Assumes normality)	16.07				95% H-Stat UCL	6472	
1175					<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>							
1176												
1177					<b>Nonparametric Distribution Free UCL Statistics</b>							
1178					<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>							
1179												
1180					<b>Suggested UCL to Use</b>							
1181					95% KM Bootstrap t UCL	51.59				Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )	87.78	
1182												
1183					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
1184					Recommendations are based upon data size, data distribution, and skewness.							
1185					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
1186					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
1187												
1188					<b>Benzo(k)fluoranthene</b>							
1189												
1190					<b>General Statistics</b>							
1191					Total Number of Observations	6				Number of Distinct Observations	6	
1192					Number of Detects	4				Number of Non-Detects	2	
1193					Number of Distinct Detects	4				Number of Distinct Non-Detects	2	
1194					Minimum Detect	0.54				Minimum Non-Detect	0.37	
1195					Maximum Detect	13				Maximum Non-Detect	0.39	
1196					Variance Detects	35.39				Percent Non-Detects	33.33%	
1197					Mean Detects	4.11				SD Detects	5.949	
1198					Median Detects	1.45				CV Detects	1.447	
1199					Skewness Detects	1.955				Kurtosis Detects	3.849	
1200					Mean of Logged Detects	0.658				SD of Logged Detects	1.364	
1201												
1202					<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>							
1203					<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>							
1204					<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>							
1205					<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>							
1206												
1207					<b>Normal GOF Test on Detects Only</b>							
1208					Shapiro Wilk Test Statistic	0.71				<b>Shapiro Wilk GOF Test</b>		
1209					5% Shapiro Wilk Critical Value	0.748				Detected Data Not Normal at 5% Significance Level		
1210					Lilliefors Test Statistic	0.401				<b>Lilliefors GOF Test</b>		
1211					5% Lilliefors Critical Value	0.375				Detected Data Not Normal at 5% Significance Level		
1212					<b>Detected Data Not Normal at 5% Significance Level</b>							
1213												
1214					<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>							
1215					KM Mean	2.863				KM Standard Error of Mean	2.15	
1216					KM SD	4.561				95% KM (BCA) UCL	N/A	
1217					95% KM (t) UCL	7.196				95% KM (Percentile Bootstrap) UCL	N/A	
1218					95% KM (z) UCL	6.4				95% KM Bootstrap t UCL	N/A	
1219					90% KM Chebyshev UCL	9.314				95% KM Chebyshev UCL	12.24	

	A	B	C	D	E	F	G	H	I	J	K	L
1220	97.5% KM Chebyshev UCL					16.29	99% KM Chebyshev UCL					24.26
1221												
1222	<b>Gamma GOF Tests on Detected Observations Only</b>											
1223	A-D Test Statistic					0.478	<b>Anderson-Darling GOF Test</b>					
1224	5% A-D Critical Value					0.67	Detected data appear Gamma Distributed at 5% Significance Level					
1225	K-S Test Statistic					0.348	<b>Kolmogorov-Smirnov GOF</b>					
1226	5% K-S Critical Value					0.405	Detected data appear Gamma Distributed at 5% Significance Level					
1227	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1228												
1229	<b>Gamma Statistics on Detected Data Only</b>											
1230	k hat (MLE)					0.787	k star (bias corrected MLE)					0.363
1231	Theta hat (MLE)					5.221	Theta star (bias corrected MLE)					11.31
1232	nu hat (MLE)					6.298	nu star (bias corrected)					2.908
1233	Mean (detects)					4.11						
1234												
1235	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1236	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1237	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1238	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1239	This is especially true when the sample size is small.											
1240	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1241	Minimum					0.01	Mean					2.743
1242	Maximum					13	Median					0.82
1243	SD					5.071	CV					1.849
1244	k hat (MLE)					0.323	k star (bias corrected MLE)					0.273
1245	Theta hat (MLE)					8.48	Theta star (bias corrected MLE)					10.05
1246	nu hat (MLE)					3.882	nu star (bias corrected)					3.274
1247	Adjusted Level of Significance ( $\beta$ )					0.0122						
1248	Approximate Chi Square Value (3.27, $\alpha$ )					0.458	Adjusted Chi Square Value (3.27, $\beta$ )					0.208
1249	95% Gamma Approximate UCL (use when $n \geq 50$ )					19.61	95% Gamma Adjusted UCL (use when $n < 50$ )					N/A
1250												
1251	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1252	Mean (KM)					2.863	SD (KM)					4.561
1253	Variance (KM)					20.8	SE of Mean (KM)					2.15
1254	k hat (KM)					0.394	k star (KM)					0.308
1255	nu hat (KM)					4.729	nu star (KM)					3.698
1256	theta hat (KM)					7.266	theta star (KM)					9.292
1257	80% gamma percentile (KM)					4.419	90% gamma percentile (KM)					8.417
1258	95% gamma percentile (KM)					12.99	99% gamma percentile (KM)					24.82
1259												
1260	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1261	Approximate Chi Square Value (3.70, $\alpha$ )					0.606	Adjusted Chi Square Value (3.70, $\beta$ )					0.286
1262	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					17.47	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					36.97
1263												
1264	<b>Lognormal GOF Test on Detected Observations Only</b>											
1265	Shapiro Wilk Test Statistic					0.922	<b>Shapiro Wilk GOF Test</b>					
1266	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Lognormal at 5% Significance Level					
1267	Lilliefors Test Statistic					0.271	<b>Lilliefors GOF Test</b>					
1268	5% Lilliefors Critical Value					0.375	Detected Data appear Lognormal at 5% Significance Level					
1269	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1270												
1271	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1272	Mean in Original Scale					2.755	Mean in Log Scale					-0.588



	A	B	C	D	E	F	G	H	I	J	K	L
1273	SD in Original Scale				5.063	SD in Log Scale				2.2		
1274	95% t UCL (assumes normality of ROS data)				6.921	95% Percentile Bootstrap UCL				6.781		
1275	95% BCA Bootstrap UCL				8.682	95% Bootstrap t UCL				26.3		
1276	95% H-UCL (Log ROS)				25176							
1277												
1278	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1279	KM Mean (logged)				0.107	KM Geo Mean				1.113		
1280	KM SD (logged)				1.24	95% Critical H Value (KM-Log)				4.955		
1281	KM Standard Error of Mean (logged)				0.584	95% H-UCL (KM -Log)				37.45		
1282	KM SD (logged)				1.24	95% Critical H Value (KM-Log)				4.955		
1283	KM Standard Error of Mean (logged)				0.584							
1284												
1285	<b>DL/2 Statistics</b>											
1286	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1287	Mean in Original Scale				2.803	Mean in Log Scale				-0.115		
1288	SD in Original Scale				5.033	SD in Log Scale				1.597		
1289	95% t UCL (Assumes normality)				6.944	95% H-Stat UCL				273.1		
1290	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1291												
1292	<b>Nonparametric Distribution Free UCL Statistics</b>											
1293	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1294												
1295	<b>Suggested UCL to Use</b>											
1296	95% KM Bootstrap t UCL				N/A	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				36.97		
1297												
1298	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1299	Recommendations are based upon data size, data distribution, and skewness.											
1300	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1301	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1302												
1303	<b>Benzo(a)pyrene</b>											
1304												
1305	<b>General Statistics</b>											
1306	Total Number of Observations				6	Number of Distinct Observations				6		
1307	Number of Detects				5	Number of Non-Detects				1		
1308	Number of Distinct Detects				5	Number of Distinct Non-Detects				1		
1309	Minimum Detect				0.16	Minimum Non-Detect				0.37		
1310	Maximum Detect				28	Maximum Non-Detect				0.37		
1311	Variance Detects				138	Percent Non-Detects				16.67%		
1312	Mean Detects				7.152	SD Detects				11.75		
1313	Median Detects				2.3	CV Detects				1.642		
1314	Skewness Detects				2.151	Kurtosis Detects				4.69		
1315	Mean of Logged Detects				0.785	SD of Logged Detects				1.877		
1316												
1317	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1318	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1319	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1320	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1321												
1322	<b>Normal GOF Test on Detects Only</b>											
1323	Shapiro Wilk Test Statistic				0.668	<b>Shapiro Wilk GOF Test</b>						
1324	5% Shapiro Wilk Critical Value				0.762	Detected Data Not Normal at 5% Significance Level						
1325	Lilliefors Test Statistic				0.403	<b>Lilliefors GOF Test</b>						

	A	B	C	D	E	F	G	H	I	J	K	L	
1326	5% Lilliefors Critical Value					0.343	Detected Data Not Normal at 5% Significance Level						
1327	<b>Detected Data Not Normal at 5% Significance Level</b>												
1328													
1329	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>												
1330	KM Mean				5.987	KM Standard Error of Mean				4.536			
1331	KM SD				9.938	95% KM (BCA) UCL				14.61			
1332	95% KM (t) UCL				15.13	95% KM (Percentile Bootstrap) UCL				14.44			
1333	95% KM (z) UCL				13.45	95% KM Bootstrap t UCL				57.15			
1334	90% KM Chebyshev UCL				19.59	95% KM Chebyshev UCL				25.76			
1335	97.5% KM Chebyshev UCL				34.31	99% KM Chebyshev UCL				51.12			
1336													
1337	<b>Gamma GOF Tests on Detected Observations Only</b>												
1338	A-D Test Statistic				0.317	<b>Anderson-Darling GOF Test</b>							
1339	5% A-D Critical Value				0.709	Detected data appear Gamma Distributed at 5% Significance Level							
1340	K-S Test Statistic				0.259	<b>Kolmogorov-Smirnov GOF</b>							
1341	5% K-S Critical Value				0.371	Detected data appear Gamma Distributed at 5% Significance Level							
1342	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
1343													
1344	<b>Gamma Statistics on Detected Data Only</b>												
1345	k hat (MLE)				0.532	k star (bias corrected MLE)				0.346			
1346	Theta hat (MLE)				13.44	Theta star (bias corrected MLE)				20.66			
1347	nu hat (MLE)				5.321	nu star (bias corrected)				3.462			
1348	Mean (detects)				7.152								
1349													
1350	<b>Gamma ROS Statistics using Imputed Non-Detects</b>												
1351	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1352	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1353	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1354	This is especially true when the sample size is small.												
1355	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1356	Minimum				0.01	Mean				5.962			
1357	Maximum				28	Median				1.75			
1358	SD				10.9	CV				1.829			
1359	k hat (MLE)				0.354	k star (bias corrected MLE)				0.288			
1360	Theta hat (MLE)				16.86	Theta star (bias corrected MLE)				20.71			
1361	nu hat (MLE)				4.243	nu star (bias corrected)				3.455			
1362	Adjusted Level of Significance ( $\beta$ )				0.0122								
1363	Approximate Chi Square Value (3.45, $\alpha$ )				0.519	Adjusted Chi Square Value (3.45, $\beta$ )				0.24			
1364	95% Gamma Approximate UCL (use when $n \geq 50$ )				39.68	95% Gamma Adjusted UCL (use when $n < 50$ )				85.98			
1365													
1366	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1367	Mean (KM)				5.987	SD (KM)				9.938			
1368	Variance (KM)				98.76	SE of Mean (KM)				4.536			
1369	k hat (KM)				0.363	k star (KM)				0.293			
1370	nu hat (KM)				4.355	nu star (KM)				3.511			
1371	theta hat (KM)				16.5	theta star (KM)				20.46			
1372	80% gamma percentile (KM)				9.123	90% gamma percentile (KM)				17.71			
1373	95% gamma percentile (KM)				27.61	99% gamma percentile (KM)				53.41			
1374													
1375	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1376	Approximate Chi Square Value (3.51, $\alpha$ )				0.539	Adjusted Chi Square Value (3.51, $\beta$ )				0.25			
1377	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				39.03	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				84.12			
1378													

	A	B	C	D	E	F	G	H	I	J	K	L
1379	<b>Lognormal GOF Test on Detected Observations Only</b>											
1380	Shapiro Wilk Test Statistic				0.986		<b>Shapiro Wilk GOF Test</b>					
1381	5% Shapiro Wilk Critical Value				0.762		Detected Data appear Lognormal at 5% Significance Level					
1382	Lilliefors Test Statistic				0.174		<b>Lilliefors GOF Test</b>					
1383	5% Lilliefors Critical Value				0.343		Detected Data appear Lognormal at 5% Significance Level					
1384	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1385												
1386	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1387	Mean in Original Scale				5.984		Mean in Log Scale				0.329	
1388	SD in Original Scale				10.89		SD in Log Scale				2.017	
1389	95% t UCL (assumes normality of ROS data)				14.94		95% Percentile Bootstrap UCL				14.44	
1390	95% BCA Bootstrap UCL				15.15		95% Bootstrap t UCL				60.27	
1391	95% H-UCL (Log ROS)				11651							
1392												
1393	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1394	KM Mean (logged)				0.349		KM Geo Mean				1.417	
1395	KM SD (logged)				1.817		95% Critical H Value (KM-Log)				7.03	
1396	KM Standard Error of Mean (logged)				0.829		95% H-UCL (KM -Log)				2235	
1397	KM SD (logged)				1.817		95% Critical H Value (KM-Log)				7.03	
1398	KM Standard Error of Mean (logged)				0.829							
1399												
1400	<b>DL/2 Statistics</b>											
1401	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1402	Mean in Original Scale				5.991		Mean in Log Scale				0.373	
1403	SD in Original Scale				10.88		SD in Log Scale				1.959	
1404	95% t UCL (Assumes normality)				14.94		95% H-Stat UCL				7393	
1405	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1406												
1407	<b>Nonparametric Distribution Free UCL Statistics</b>											
1408	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1409												
1410	<b>Suggested UCL to Use</b>											
1411	95% KM Bootstrap t UCL				57.15		Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				84.12	
1412												
1413	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1414	Recommendations are based upon data size, data distribution, and skewness.											
1415	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1416	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1417												
1418	<b>Chrysene</b>											
1419												
1420	<b>General Statistics</b>											
1421	Total Number of Observations				6		Number of Distinct Observations				6	
1422	Number of Detects				5		Number of Non-Detects				1	
1423	Number of Distinct Detects				5		Number of Distinct Non-Detects				1	
1424	Minimum Detect				0.15		Minimum Non-Detect				0.37	
1425	Maximum Detect				27		Maximum Non-Detect				0.37	
1426	Variance Detects				128.6		Percent Non-Detects				16.67%	
1427	Mean Detects				6.85		SD Detects				11.34	
1428	Median Detects				2.4		CV Detects				1.655	
1429	Skewness Detects				2.163		Kurtosis Detects				4.736	
1430	Mean of Logged Detects				0.73		SD of Logged Detects				1.885	
1431												

	A	B	C	D	E	F	G	H	I	J	K	L
1432	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1433	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1434	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1435	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1436												
1437	<b>Normal GOF Test on Detects Only</b>											
1438	Shapiro Wilk Test Statistic				0.662		<b>Shapiro Wilk GOF Test</b>					
1439	5% Shapiro Wilk Critical Value				0.762		Detected Data Not Normal at 5% Significance Level					
1440	Lilliefors Test Statistic				0.413		<b>Lilliefors GOF Test</b>					
1441	5% Lilliefors Critical Value				0.343		Detected Data Not Normal at 5% Significance Level					
1442	<b>Detected Data Not Normal at 5% Significance Level</b>											
1443												
1444	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1445	KM Mean				5.733		KM Standard Error of Mean				4.377	
1446	KM SD				9.589		95% KM (BCA) UCL				14.48	
1447	95% KM (t) UCL				14.55		95% KM (Percentile Bootstrap) UCL				13.95	
1448	95% KM (z) UCL				12.93		95% KM Bootstrap t UCL				53.67	
1449	90% KM Chebyshev UCL				18.86		95% KM Chebyshev UCL				24.81	
1450	97.5% KM Chebyshev UCL				33.07		99% KM Chebyshev UCL				49.28	
1451												
1452	<b>Gamma GOF Tests on Detected Observations Only</b>											
1453	A-D Test Statistic				0.332		<b>Anderson-Darling GOF Test</b>					
1454	5% A-D Critical Value				0.71		Detected data appear Gamma Distributed at 5% Significance Level					
1455	K-S Test Statistic				0.278		<b>Kolmogorov-Smirnov GOF</b>					
1456	5% K-S Critical Value				0.371		Detected data appear Gamma Distributed at 5% Significance Level					
1457	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1458												
1459	<b>Gamma Statistics on Detected Data Only</b>											
1460	k hat (MLE)				0.528		k star (bias corrected MLE)				0.344	
1461	Theta hat (MLE)				12.99		Theta star (bias corrected MLE)				19.89	
1462	nu hat (MLE)				5.275		nu star (bias corrected)				3.443	
1463	Mean (detects)				6.85							
1464												
1465	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1466	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1467	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1468	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1469	This is especially true when the sample size is small.											
1470	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1471	Minimum				0.01		Mean				5.71	
1472	Maximum				27		Median				1.75	
1473	SD				10.52		CV				1.842	
1474	k hat (MLE)				0.353		k star (bias corrected MLE)				0.288	
1475	Theta hat (MLE)				16.17		Theta star (bias corrected MLE)				19.85	
1476	nu hat (MLE)				4.238		nu star (bias corrected)				3.452	
1477	Adjusted Level of Significance ( $\beta$ )				0.0122							
1478	Approximate Chi Square Value (3.45, $\alpha$ )				0.518		Adjusted Chi Square Value (3.45, $\beta$ )				0.239	
1479	95% Gamma Approximate UCL (use when $n \geq 50$ )				38.05		95% Gamma Adjusted UCL (use when $n < 50$ )				82.45	
1480												
1481	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1482	Mean (KM)				5.733		SD (KM)				9.589	
1483	Variance (KM)				91.96		SE of Mean (KM)				4.377	
1484	k hat (KM)				0.357		k star (KM)				0.29	

	A	B	C	D	E	F	G	H	I	J	K	L
1485					nu hat (KM)	4.289					nu star (KM)	3.478
1486					theta hat (KM)	16.04					theta star (KM)	19.78
1487					80% gamma percentile (KM)	8.715					90% gamma percentile (KM)	16.98
1488					95% gamma percentile (KM)	26.52					99% gamma percentile (KM)	51.42
1489												
1490	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1491					Approximate Chi Square Value (3.48, $\alpha$ )	0.527					Adjusted Chi Square Value (3.48, $\beta$ )	0.244
1492					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	37.83					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	81.8
1493												
1494	<b>Lognormal GOF Test on Detected Observations Only</b>											
1495					Shapiro Wilk Test Statistic	0.983					<b>Shapiro Wilk GOF Test</b>	
1496					5% Shapiro Wilk Critical Value	0.762					Detected Data appear Lognormal at 5% Significance Level	
1497					Lilliefors Test Statistic	0.185					<b>Lilliefors GOF Test</b>	
1498					5% Lilliefors Critical Value	0.343					Detected Data appear Lognormal at 5% Significance Level	
1499	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1500												
1501	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1502					Mean in Original Scale	5.731					Mean in Log Scale	0.273
1503					SD in Original Scale	10.51					SD in Log Scale	2.024
1504					95% t UCL (assumes normality of ROS data)	14.37					95% Percentile Bootstrap UCL	14.05
1505					95% BCA Bootstrap UCL	14.73					95% Bootstrap t UCL	52.67
1506					95% H-UCL (Log ROS)	11703						
1507												
1508	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1509					KM Mean (logged)	0.292					KM Geo Mean	1.339
1510					KM SD (logged)	1.824					95% Critical H Value (KM-Log)	7.056
1511					KM Standard Error of Mean (logged)	0.833					95% H-UCL (KM -Log)	2236
1512					KM SD (logged)	1.824					95% Critical H Value (KM-Log)	7.056
1513					KM Standard Error of Mean (logged)	0.833						
1514												
1515	<b>DL/2 Statistics</b>											
1516	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1517					Mean in Original Scale	5.739					Mean in Log Scale	0.327
1518					SD in Original Scale	10.5					SD in Log Scale	1.954
1519					95% t UCL (Assumes normality)	14.38					95% H-Stat UCL	6733
1520	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1521												
1522	<b>Nonparametric Distribution Free UCL Statistics</b>											
1523	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1524												
1525	<b>Suggested UCL to Use</b>											
1526					95% KM Bootstrap t UCL	53.67					Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )	81.8
1527												
1528	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1529	Recommendations are based upon data size, data distribution, and skewness.											
1530	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1531	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1532												
1533	<b>Dibenz(a,h)anthracene</b>											
1534												
1535	<b>General Statistics</b>											
1536					Total Number of Observations	6					Number of Distinct Observations	6
1537					Number of Detects	4					Number of Non-Detects	2

	A	B	C	D	E	F	G	H	I	J	K	L
1538	Number of Distinct Detects					4	Number of Distinct Non-Detects					2
1539	Minimum Detect					0.19	Minimum Non-Detect					0.37
1540	Maximum Detect					4.1	Maximum Non-Detect					0.39
1541	Variance Detects					3.48	Percent Non-Detects					33.33%
1542	Mean Detects					1.31	SD Detects					1.865
1543	Median Detects					0.475	CV Detects					1.424
1544	Skewness Detects					1.965	Kurtosis Detects					3.889
1545	Mean of Logged Detects					-0.438	SD of Logged Detects					1.309
1546												
1547	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1548	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1549	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1550	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1551												
1552	<b>Normal GOF Test on Detects Only</b>											
1553	Shapiro Wilk Test Statistic					0.701	<b>Shapiro Wilk GOF Test</b>					
1554	5% Shapiro Wilk Critical Value					0.748	Detected Data Not Normal at 5% Significance Level					
1555	Lilliefors Test Statistic					0.412	<b>Lilliefors GOF Test</b>					
1556	5% Lilliefors Critical Value					0.375	Detected Data Not Normal at 5% Significance Level					
1557	<b>Detected Data Not Normal at 5% Significance Level</b>											
1558												
1559	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1560	KM Mean					0.937	KM Standard Error of Mean					0.67
1561	KM SD					1.421	95% KM (BCA) UCL					N/A
1562	95% KM (t) UCL					2.286	95% KM (Percentile Bootstrap) UCL					N/A
1563	95% KM (z) UCL					2.038	95% KM Bootstrap t UCL					N/A
1564	90% KM Chebyshev UCL					2.946	95% KM Chebyshev UCL					3.856
1565	97.5% KM Chebyshev UCL					5.119	99% KM Chebyshev UCL					7.601
1566												
1567	<b>Gamma GOF Tests on Detected Observations Only</b>											
1568	A-D Test Statistic					0.529	<b>Anderson-Darling GOF Test</b>					
1569	5% A-D Critical Value					0.669	Detected data appear Gamma Distributed at 5% Significance Level					
1570	K-S Test Statistic					0.38	<b>Kolmogorov-Smirnov GOF</b>					
1571	5% K-S Critical Value					0.404	Detected data appear Gamma Distributed at 5% Significance Level					
1572	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1573												
1574	<b>Gamma Statistics on Detected Data Only</b>											
1575	k hat (MLE)					0.834	k star (bias corrected MLE)					0.375
1576	Theta hat (MLE)					1.571	Theta star (bias corrected MLE)					3.492
1577	nu hat (MLE)					6.67	nu star (bias corrected)					3.001
1578	Mean (detects)					1.31						
1579												
1580	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1581	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1582	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1583	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1584	This is especially true when the sample size is small.											
1585	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1586	Minimum					0.01	Mean					0.877
1587	Maximum					4.1	Median					0.305
1588	SD					1.593	CV					1.817
1589	k hat (MLE)					0.39	k star (bias corrected MLE)					0.306
1590	Theta hat (MLE)					2.249	Theta star (bias corrected MLE)					2.865

	A	B	C	D	E	F	G	H	I	J	K	L	
1591	nu hat (MLE)				4.677	nu star (bias corrected)				3.672			
1592	Adjusted Level of Significance ( $\beta$ )				0.0122								
1593	Approximate Chi Square Value (3.67, $\alpha$ )				0.597	Adjusted Chi Square Value (3.67, $\beta$ )				0.281			
1594	95% Gamma Approximate UCL (use when $n \geq 50$ )				5.396	95% Gamma Adjusted UCL (use when $n < 50$ )				N/A			
1595													
1596	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1597	Mean (KM)				0.937	SD (KM)				1.421			
1598	Variance (KM)				2.019	SE of Mean (KM)				0.67			
1599	k hat (KM)				0.435	k star (KM)				0.328			
1600	nu hat (KM)				5.216	nu star (KM)				3.941			
1601	theta hat (KM)				2.155	theta star (KM)				2.852			
1602	80% gamma percentile (KM)				1.466	90% gamma percentile (KM)				2.73			
1603	95% gamma percentile (KM)				4.16	99% gamma percentile (KM)				7.836			
1604													
1605	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1606	Approximate Chi Square Value (3.94, $\alpha$ )				0.699	Adjusted Chi Square Value (3.94, $\beta$ )				0.339			
1607	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				5.284	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				10.9			
1608													
1609	<b>Lognormal GOF Test on Detected Observations Only</b>												
1610	Shapiro Wilk Test Statistic				0.9	<b>Shapiro Wilk GOF Test</b>							
1611	5% Shapiro Wilk Critical Value				0.748	Detected Data appear Lognormal at 5% Significance Level							
1612	Lilliefors Test Statistic				0.31	<b>Lilliefors GOF Test</b>							
1613	5% Lilliefors Critical Value				0.375	Detected Data appear Lognormal at 5% Significance Level							
1614	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
1615													
1616	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1617	Mean in Original Scale				0.919	Mean in Log Scale				-0.957			
1618	SD in Original Scale				1.567	SD in Log Scale				1.294			
1619	95% t UCL (assumes normality of ROS data)				2.208	95% Percentile Bootstrap UCL				2.136			
1620	95% BCA Bootstrap UCL				2.249	95% Bootstrap t UCL				10.86			
1621	95% H-UCL (Log ROS)				17.38								
1622													
1623	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1624	KM Mean (logged)				-0.846	KM Geo Mean				0.429			
1625	KM SD (logged)				1.09	95% Critical H Value (KM-Log)				4.443			
1626	KM Standard Error of Mean (logged)				0.514	95% H-UCL (KM -Log)				6.786			
1627	KM SD (logged)				1.09	95% Critical H Value (KM-Log)				4.443			
1628	KM Standard Error of Mean (logged)				0.514								
1629													
1630	<b>DL/2 Statistics</b>												
1631	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>						
1632	Mean in Original Scale				0.937	Mean in Log Scale				-0.846			
1633	SD in Original Scale				1.556	SD in Log Scale				1.194			
1634	95% t UCL (Assumes normality)				2.217	95% H-Stat UCL				11.39			
1635	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
1636													
1637	<b>Nonparametric Distribution Free UCL Statistics</b>												
1638	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>												
1639													
1640	<b>Suggested UCL to Use</b>												
1641	95% KM Bootstrap t UCL				N/A	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				10.9			
1642													
1643	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												

	A	B	C	D	E	F	G	H	I	J	K	L
1644	Recommendations are based upon data size, data distribution, and skewness.											
1645	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1646	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1647												
1648	<b>Indeno(1,2,3-cd)pyrene</b>											
1649												
1650	<b>General Statistics</b>											
1651	Total Number of Observations				6		Number of Distinct Observations				6	
1652	Number of Detects				4		Number of Non-Detects				2	
1653	Number of Distinct Detects				4		Number of Distinct Non-Detects				2	
1654	Minimum Detect				0.82		Minimum Non-Detect				0.37	
1655	Maximum Detect				19		Maximum Non-Detect				0.39	
1656	Variance Detects				75.76		Percent Non-Detects				33.33%	
1657	Mean Detects				5.98		SD Detects				8.704	
1658	Median Detects				2.05		CV Detects				1.456	
1659	Skewness Detects				1.967		Kurtosis Detects				3.891	
1660	Mean of Logged Detects				1.038		SD of Logged Detects				1.347	
1661												
1662	<b>Note: Sample size is small (e.g., &lt;10), if data are collected using ISM approach, you should use</b>											
1663	<b>guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.</b>											
1664	<b>For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).</b>											
1665	<b>Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1</b>											
1666												
1667	<b>Normal GOF Test on Detects Only</b>											
1668	Shapiro Wilk Test Statistic				0.7		<b>Shapiro Wilk GOF Test</b>					
1669	5% Shapiro Wilk Critical Value				0.748		Detected Data Not Normal at 5% Significance Level					
1670	Lilliefors Test Statistic				0.41		<b>Lilliefors GOF Test</b>					
1671	5% Lilliefors Critical Value				0.375		Detected Data Not Normal at 5% Significance Level					
1672	<b>Detected Data Not Normal at 5% Significance Level</b>											
1673												
1674	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1675	KM Mean				4.11		KM Standard Error of Mean				3.158	
1676	KM SD				6.699		95% KM (BCA) UCL				N/A	
1677	95% KM (t) UCL				10.47		95% KM (Percentile Bootstrap) UCL				N/A	
1678	95% KM (z) UCL				9.304		95% KM Bootstrap t UCL				N/A	
1679	90% KM Chebyshev UCL				13.58		95% KM Chebyshev UCL				17.87	
1680	97.5% KM Chebyshev UCL				23.83		99% KM Chebyshev UCL				35.53	
1681												
1682	<b>Gamma GOF Tests on Detected Observations Only</b>											
1683	A-D Test Statistic				0.521		<b>Anderson-Darling GOF Test</b>					
1684	5% A-D Critical Value				0.67		Detected data appear Gamma Distributed at 5% Significance Level					
1685	K-S Test Statistic				0.371		<b>Kolmogorov-Smirnov GOF</b>					
1686	5% K-S Critical Value				0.405		Detected data appear Gamma Distributed at 5% Significance Level					
1687	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1688												
1689	<b>Gamma Statistics on Detected Data Only</b>											
1690	k hat (MLE)				0.792		k star (bias corrected MLE)				0.365	
1691	Theta hat (MLE)				7.551		Theta star (bias corrected MLE)				16.4	
1692	nu hat (MLE)				6.336		nu star (bias corrected)				2.917	
1693	Mean (detects)				5.98							
1694												
1695	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1696	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											



	A	B	C	D	E	F	G	H	I	J	K	L	
1697	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1698	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1699	This is especially true when the sample size is small.												
1700	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1701		Minimum			0.01					Mean		3.99	
1702		Maximum			19					Median		1.26	
1703		SD			7.414					CV		1.858	
1704		k hat (MLE)			0.308					k star (bias corrected MLE)		0.265	
1705		Theta hat (MLE)			12.94					Theta star (bias corrected MLE)		15.04	
1706		nu hat (MLE)			3.699					nu star (bias corrected)		3.183	
1707		Adjusted Level of Significance ( $\beta$ )			0.0122								
1708		Approximate Chi Square Value (3.18, $\alpha$ )			0.429					Adjusted Chi Square Value (3.18, $\beta$ )		0.194	
1709		95% Gamma Approximate UCL (use when $n \geq 50$ )			29.63					95% Gamma Adjusted UCL (use when $n < 50$ )		N/A	
1710													
1711	<b>Estimates of Gamma Parameters using KM Estimates</b>												
1712		Mean (KM)			4.11					SD (KM)		6.699	
1713		Variance (KM)			44.87					SE of Mean (KM)		3.158	
1714		k hat (KM)			0.376					k star (KM)		0.299	
1715		nu hat (KM)			4.517					nu star (KM)		3.592	
1716		theta hat (KM)			10.92					theta star (KM)		13.73	
1717		80% gamma percentile (KM)			6.3					90% gamma percentile (KM)		12.13	
1718		95% gamma percentile (KM)			18.81					99% gamma percentile (KM)		36.2	
1719													
1720	<b>Gamma Kaplan-Meier (KM) Statistics</b>												
1721		Approximate Chi Square Value (3.59, $\alpha$ )			0.567					Adjusted Chi Square Value (3.59, $\beta$ )		0.265	
1722		95% Gamma Approximate KM-UCL (use when $n \geq 50$ )			26.02					95% Gamma Adjusted KM-UCL (use when $n < 50$ )		55.65	
1723													
1724	<b>Lognormal GOF Test on Detected Observations Only</b>												
1725		Shapiro Wilk Test Statistic			0.903					<b>Shapiro Wilk GOF Test</b>			
1726		5% Shapiro Wilk Critical Value			0.748					Detected Data appear Lognormal at 5% Significance Level			
1727		Lilliefors Test Statistic			0.298					<b>Lilliefors GOF Test</b>			
1728		5% Lilliefors Critical Value			0.375					Detected Data appear Lognormal at 5% Significance Level			
1729	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
1730													
1731	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
1732		Mean in Original Scale			4.011					Mean in Log Scale		-0.179	
1733		SD in Original Scale			7.4					SD in Log Scale		2.155	
1734		95% t UCL (assumes normality of ROS data)			10.1					95% Percentile Bootstrap UCL		9.808	
1735		95% BCA Bootstrap UCL			10.2					95% Bootstrap t UCL		35.98	
1736		95% H-UCL (Log ROS)			24616								
1737													
1738	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
1739		KM Mean (logged)			0.361					KM Geo Mean		1.434	
1740		KM SD (logged)			1.351					95% Critical H Value (KM-Log)		5.347	
1741		KM Standard Error of Mean (logged)			0.637					95% H-UCL (KM -Log)		90.41	
1742		KM SD (logged)			1.351					95% Critical H Value (KM-Log)		5.347	
1743		KM Standard Error of Mean (logged)			0.637								
1744													
1745	<b>DL/2 Statistics</b>												
1746		<b>DL/2 Normal</b>								<b>DL/2 Log-Transformed</b>			
1747		Mean in Original Scale			4.05					Mean in Log Scale		0.138	
1748		SD in Original Scale			7.375					SD in Log Scale		1.741	
1749		95% t UCL (Assumes normality)			10.12					95% H-Stat UCL		1007	

	A	B	C	D	E	F	G	H	I	J	K	L
1750	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1751												
1752	<b>Nonparametric Distribution Free UCL Statistics</b>											
1753	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1754												
1755	<b>Suggested UCL to Use</b>											
1756	95% KM Bootstrap t UCL				N/A		Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				55.65	
1757												
1758	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1759	Recommendations are based upon data size, data distribution, and skewness.											
1760	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1761	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1762												

	A	B	C	D	E	F	G	H	I	J	K	L	
1	<b>UCL Statistics for Data Sets with Non-Detects</b>												
2													
3	User Selected Options												
4	Date/Time of Computation		ProUCL 5.11/17/2020 8:24:36 AM										
5	From File		WP_allsoil_prouclin.xls										
6	Full Precision		OFF										
7	Confidence Coefficient		95%										
8	Number of Bootstrap Operations		2000										
9													
10													
11	<b>Aluminum</b>												
12													
13	<b>General Statistics</b>												
14	Total Number of Observations				12		Number of Distinct Observations				12		
15									Number of Missing Observations				0
16	Minimum				5370		Mean				9363		
17	Maximum				17900		Median				7935		
18	SD				4280		Std. Error of Mean				1235		
19	Coefficient of Variation				0.457		Skewness				1.132		
20													
21	<b>Normal GOF Test</b>												
22	Shapiro Wilk Test Statistic				0.833		<b>Shapiro Wilk GOF Test</b>						
23	5% Shapiro Wilk Critical Value				0.859		Data Not Normal at 5% Significance Level						
24	Lilliefors Test Statistic				0.227		<b>Lilliefors GOF Test</b>						
25	5% Lilliefors Critical Value				0.243		Data appear Normal at 5% Significance Level						
26	<b>Data appear Approximate Normal at 5% Significance Level</b>												
27													
28	<b>Assuming Normal Distribution</b>												
29	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
30	95% Student's-t UCL				11581		95% Adjusted-CLT UCL (Chen-1995)				11826		
31									95% Modified-t UCL (Johnson-1978)				11648
32													
33	<b>Gamma GOF Test</b>												
34	A-D Test Statistic				0.621		<b>Anderson-Darling Gamma GOF Test</b>						
35	5% A-D Critical Value				0.732		Detected data appear Gamma Distributed at 5% Significance Level						
36	K-S Test Statistic				0.183		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
37	5% K-S Critical Value				0.246		Detected data appear Gamma Distributed at 5% Significance Level						
38	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
39													
40	<b>Gamma Statistics</b>												
41	k hat (MLE)				6.122		k star (bias corrected MLE)				4.647		
42	Theta hat (MLE)				1529		Theta star (bias corrected MLE)				2015		
43	nu hat (MLE)				146.9		nu star (bias corrected)				111.5		
44	MLE Mean (bias corrected)				9363		MLE Sd (bias corrected)				4343		
45									Approximate Chi Square Value (0.05)				88.14
46	Adjusted Level of Significance				0.029		Adjusted Chi Square Value				84.98		
47													
48	<b>Assuming Gamma Distribution</b>												
49	95% Approximate Gamma UCL (use when n>=50))				11846		95% Adjusted Gamma UCL (use when n<50)				12287		
50													
51	<b>Lognormal GOF Test</b>												
52	Shapiro Wilk Test Statistic				0.901		<b>Shapiro Wilk Lognormal GOF Test</b>						
53	5% Shapiro Wilk Critical Value				0.859		Data appear Lognormal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
54	Lilliefors Test Statistic					0.155	Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value					0.243	Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data					8.589	Mean of logged Data					9.061
60	Maximum of Logged Data					9.793	SD of logged Data					0.414
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL					12104	90% Chebyshev (MVUE) UCL					12704
64	95% Chebyshev (MVUE) UCL					14242	97.5% Chebyshev (MVUE) UCL					16377
65	99% Chebyshev (MVUE) UCL					20570						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL					11395	95% Jackknife UCL					11581
72	95% Standard Bootstrap UCL					11316	95% Bootstrap-t UCL					12686
73	95% Hall's Bootstrap UCL					11564	95% Percentile Bootstrap UCL					11368
74	95% BCA Bootstrap UCL					11788						
75	90% Chebyshev(Mean, Sd) UCL					13069	95% Chebyshev(Mean, Sd) UCL					14747
76	97.5% Chebyshev(Mean, Sd) UCL					17078	99% Chebyshev(Mean, Sd) UCL					21655
77												
78	Suggested UCL to Use											
79	95% Student's-t UCL					11581						
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												
89	Antimony											
90												
91	General Statistics											
92	Total Number of Observations					12	Number of Distinct Observations					10
93	Number of Detects					7	Number of Non-Detects					5
94	Number of Distinct Detects					6	Number of Distinct Non-Detects					4
95	Minimum Detect					0.7	Minimum Non-Detect					6.4
96	Maximum Detect					9.3	Maximum Non-Detect					7
97	Variance Detects					9.442	Percent Non-Detects					41.67%
98	Mean Detects					2.529	SD Detects					3.073
99	Median Detects					1.5	CV Detects					1.215
100	Skewness Detects					2.348	Kurtosis Detects					5.774
101	Mean of Logged Detects					0.487	SD of Logged Detects					0.935
102												
103	Normal GOF Test on Detects Only											
104	Shapiro Wilk Test Statistic					0.654	Shapiro Wilk GOF Test					
105	5% Shapiro Wilk Critical Value					0.803	Detected Data Not Normal at 5% Significance Level					
106	Lilliefors Test Statistic					0.374	Lilliefors GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
107	5% Lilliefors Critical Value					0.304	Detected Data Not Normal at 5% Significance Level					
108	<b>Detected Data Not Normal at 5% Significance Level</b>											
109												
110	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
111	KM Mean					2.058	KM Standard Error of Mean					0.741
112	KM SD					2.291	95% KM (BCA) UCL					3.48
113	95% KM (t) UCL					3.39	95% KM (Percentile Bootstrap) UCL					3.3
114	95% KM (z) UCL					3.278	95% KM Bootstrap t UCL					5.049
115	90% KM Chebyshev UCL					4.282	95% KM Chebyshev UCL					5.29
116	97.5% KM Chebyshev UCL					6.688	99% KM Chebyshev UCL					9.434
117												
118	<b>Gamma GOF Tests on Detected Observations Only</b>											
119	A-D Test Statistic					0.636	<b>Anderson-Darling GOF Test</b>					
120	5% A-D Critical Value					0.724	Detected data appear Gamma Distributed at 5% Significance Level					
121	K-S Test Statistic					0.262	<b>Kolmogorov-Smirnov GOF</b>					
122	5% K-S Critical Value					0.318	Detected data appear Gamma Distributed at 5% Significance Level					
123	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
124												
125	<b>Gamma Statistics on Detected Data Only</b>											
126	k hat (MLE)					1.275	k star (bias corrected MLE)					0.824
127	Theta hat (MLE)					1.983	Theta star (bias corrected MLE)					3.069
128	nu hat (MLE)					17.85	nu star (bias corrected)					11.53
129	Mean (detects)					2.529						
130												
131	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
132	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
133	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
134	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
135	This is especially true when the sample size is small.											
136	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
137	Minimum					0.526	Mean					2.033
138	Maximum					9.3	Median					1.297
139	SD					2.38	CV					1.171
140	k hat (MLE)					1.593	k star (bias corrected MLE)					1.251
141	Theta hat (MLE)					1.276	Theta star (bias corrected MLE)					1.625
142	nu hat (MLE)					38.24	nu star (bias corrected)					30.02
143	Adjusted Level of Significance ( $\beta$ )					0.029						
144	Approximate Chi Square Value (30.02, $\alpha$ )					18.51	Adjusted Chi Square Value (30.02, $\beta$ )					17.14
145	95% Gamma Approximate UCL (use when $n \geq 50$ )					3.297	95% Gamma Adjusted UCL (use when $n < 50$ )					3.56
146												
147	<b>Estimates of Gamma Parameters using KM Estimates</b>											
148	Mean (KM)					2.058	SD (KM)					2.291
149	Variance (KM)					5.25	SE of Mean (KM)					0.741
150	k hat (KM)					0.807	k star (KM)					0.661
151	nu hat (KM)					19.37	nu star (KM)					15.86
152	theta hat (KM)					2.551	theta star (KM)					3.115
153	80% gamma percentile (KM)					3.389	90% gamma percentile (KM)					5.237
154	95% gamma percentile (KM)					7.153	99% gamma percentile (KM)					11.75
155												
156	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
157	Approximate Chi Square Value (15.86, $\alpha$ )					7.863	Adjusted Chi Square Value (15.86, $\beta$ )					7.019
158	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					4.152	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					4.65
159												

	A	B	C	D	E	F	G	H	I	J	K	L	
160	<b>Lognormal GOF Test on Detected Observations Only</b>												
161	Shapiro Wilk Test Statistic				0.868	<b>Shapiro Wilk GOF Test</b>							
162	5% Shapiro Wilk Critical Value				0.803	Detected Data appear Lognormal at 5% Significance Level							
163	Lilliefors Test Statistic				0.205	<b>Lilliefors GOF Test</b>							
164	5% Lilliefors Critical Value				0.304	Detected Data appear Lognormal at 5% Significance Level							
165	<b>Detected Data appear Lognormal at 5% Significance Level</b>												
166													
167	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>												
168	Mean in Original Scale				2.028	Mean in Log Scale				0.39			
169	SD in Original Scale				2.362	SD in Log Scale				0.719			
170	95% t UCL (assumes normality of ROS data)				3.252	95% Percentile Bootstrap UCL				3.322			
171	95% BCA Bootstrap UCL				4.044	95% Bootstrap t UCL				6.093			
172	95% H-UCL (Log ROS)				3.247								
173													
174	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>												
175	KM Mean (logged)				0.366	KM Geo Mean				1.442			
176	KM SD (logged)				0.759	95% Critical H Value (KM-Log)				2.504			
177	KM Standard Error of Mean (logged)				0.277	95% H-UCL (KM -Log)				3.408			
178	KM SD (logged)				0.759	95% Critical H Value (KM-Log)				2.504			
179	KM Standard Error of Mean (logged)				0.277								
180													
181	<b>DL/2 Statistics</b>												
182	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>							
183	Mean in Original Scale				2.863	Mean in Log Scale				0.785			
184	SD in Original Scale				2.308	SD in Log Scale				0.783			
185	95% t UCL (Assumes normality)				4.059	95% H-Stat UCL				5.428			
186	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>												
187													
188	<b>Nonparametric Distribution Free UCL Statistics</b>												
189	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>												
190													
191	<b>Suggested UCL to Use</b>												
192	95% KM Bootstrap t UCL				5.049	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				4.65			
193													
194	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
195	Recommendations are based upon data size, data distribution, and skewness.												
196	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
197	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
198													
199													
200	<b>Arsenic</b>												
201													
202	<b>General Statistics</b>												
203	Total Number of Observations				12	Number of Distinct Observations				12			
204						Number of Missing Observations				0			
205	Minimum				3.6	Mean				9.05			
206	Maximum				15.9	Median				7.85			
207	SD				3.838	Std. Error of Mean				1.108			
208	Coefficient of Variation				0.424	Skewness				0.55			
209													
210	<b>Normal GOF Test</b>												
211	Shapiro Wilk Test Statistic				0.947	<b>Shapiro Wilk GOF Test</b>							
212	5% Shapiro Wilk Critical Value				0.859	Data appear Normal at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L
213	Lilliefors Test Statistic					0.191	Lilliefors GOF Test					
214	5% Lilliefors Critical Value					0.243	Data appear Normal at 5% Significance Level					
215	Data appear Normal at 5% Significance Level											
216												
217	Assuming Normal Distribution											
218	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
219	95% Student's-t UCL					11.04	95% Adjusted-CLT UCL (Chen-1995)					11.06
220						95% Modified-t UCL (Johnson-1978)					11.07	
221												
222	Gamma GOF Test											
223	A-D Test Statistic					0.192	Anderson-Darling Gamma GOF Test					
224	5% A-D Critical Value					0.732	Detected data appear Gamma Distributed at 5% Significance Level					
225	K-S Test Statistic					0.146	Kolmogorov-Smirnov Gamma GOF Test					
226	5% K-S Critical Value					0.246	Detected data appear Gamma Distributed at 5% Significance Level					
227	Detected data appear Gamma Distributed at 5% Significance Level											
228												
229	Gamma Statistics											
230	k hat (MLE)					5.98	k star (bias corrected MLE)					4.541
231	Theta hat (MLE)					1.513	Theta star (bias corrected MLE)					1.993
232	nu hat (MLE)					143.5	nu star (bias corrected)					109
233	MLE Mean (bias corrected)					9.05	MLE Sd (bias corrected)					4.247
234						Approximate Chi Square Value (0.05)					85.88	
235	Adjusted Level of Significance					0.029	Adjusted Chi Square Value					82.76
236												
237	Assuming Gamma Distribution											
238	95% Approximate Gamma UCL (use when n>=50))					11.48	95% Adjusted Gamma UCL (use when n<50)					11.92
239												
240	Lognormal GOF Test											
241	Shapiro Wilk Test Statistic					0.973	Shapiro Wilk Lognormal GOF Test					
242	5% Shapiro Wilk Critical Value					0.859	Data appear Lognormal at 5% Significance Level					
243	Lilliefors Test Statistic					0.117	Lilliefors Lognormal GOF Test					
244	5% Lilliefors Critical Value					0.243	Data appear Lognormal at 5% Significance Level					
245	Data appear Lognormal at 5% Significance Level											
246												
247	Lognormal Statistics											
248	Minimum of Logged Data					1.281	Mean of logged Data					2.117
249	Maximum of Logged Data					2.766	SD of logged Data					0.442
250												
251	Assuming Lognormal Distribution											
252	95% H-UCL					12.07	90% Chebyshev (MVUE) UCL					12.62
253	95% Chebyshev (MVUE) UCL					14.22	97.5% Chebyshev (MVUE) UCL					16.44
254	99% Chebyshev (MVUE) UCL					20.82						
255												
256	Nonparametric Distribution Free UCL Statistics											
257	Data appear to follow a Discernible Distribution at 5% Significance Level											
258												
259	Nonparametric Distribution Free UCLs											
260	95% CLT UCL					10.87	95% Jackknife UCL					11.04
261	95% Standard Bootstrap UCL					10.8	95% Bootstrap-t UCL					11.38
262	95% Hall's Bootstrap UCL					11.06	95% Percentile Bootstrap UCL					10.82
263	95% BCA Bootstrap UCL					11.01						
264	90% Chebyshev(Mean, Sd) UCL					12.37	95% Chebyshev(Mean, Sd) UCL					13.88
265	97.5% Chebyshev(Mean, Sd) UCL					15.97	99% Chebyshev(Mean, Sd) UCL					20.07

	A	B	C	D	E	F	G	H	I	J	K	L	
266													
267	<b>Suggested UCL to Use</b>												
268	95% Student's-t UCL					11.04							
269													
270	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
271	Recommendations are based upon data size, data distribution, and skewness.												
272	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
273	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
274													
275													
276	<b>Barium</b>												
277													
278	<b>General Statistics</b>												
279	Total Number of Observations				12		Number of Distinct Observations				11		
280									Number of Missing Observations				0
281	Minimum				60.3		Mean				190.2		
282	Maximum				676		Median				130.5		
283	SD				174.4		Std. Error of Mean				50.34		
284	Coefficient of Variation				0.917		Skewness				2.346		
285													
286	<b>Normal GOF Test</b>												
287	Shapiro Wilk Test Statistic				0.691		<b>Shapiro Wilk GOF Test</b>						
288	5% Shapiro Wilk Critical Value				0.859		Data Not Normal at 5% Significance Level						
289	Lilliefors Test Statistic				0.309		<b>Lilliefors GOF Test</b>						
290	5% Lilliefors Critical Value				0.243		Data Not Normal at 5% Significance Level						
291	<b>Data Not Normal at 5% Significance Level</b>												
292													
293	<b>Assuming Normal Distribution</b>												
294	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
295	95% Student's-t UCL				280.6		95% Adjusted-CLT UCL (Chen-1995)				309.4		
296									95% Modified-t UCL (Johnson-1978)				286.3
297													
298	<b>Gamma GOF Test</b>												
299	A-D Test Statistic				0.764		<b>Anderson-Darling Gamma GOF Test</b>						
300	5% A-D Critical Value				0.741		Data Not Gamma Distributed at 5% Significance Level						
301	K-S Test Statistic				0.262		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
302	5% K-S Critical Value				0.248		Data Not Gamma Distributed at 5% Significance Level						
303	<b>Data Not Gamma Distributed at 5% Significance Level</b>												
304													
305	<b>Gamma Statistics</b>												
306	k hat (MLE)				2.104		k star (bias corrected MLE)				1.634		
307	Theta hat (MLE)				90.39		Theta star (bias corrected MLE)				116.4		
308	nu hat (MLE)				50.5		nu star (bias corrected)				39.21		
309	MLE Mean (bias corrected)				190.2		MLE Sd (bias corrected)				148.8		
310									Approximate Chi Square Value (0.05)				25.86
311	Adjusted Level of Significance				0.029		Adjusted Chi Square Value				24.22		
312													
313	<b>Assuming Gamma Distribution</b>												
314	95% Approximate Gamma UCL (use when n>=50))				288.3		95% Adjusted Gamma UCL (use when n<50)				307.9		
315													
316	<b>Lognormal GOF Test</b>												
317	Shapiro Wilk Test Statistic				0.917		<b>Shapiro Wilk Lognormal GOF Test</b>						
318	5% Shapiro Wilk Critical Value				0.859		Data appear Lognormal at 5% Significance Level						



	A	B	C	D	E	F	G	H	I	J	K	L		
319	Lilliefors Test Statistic				0.221	Lilliefors Lognormal GOF Test								
320	5% Lilliefors Critical Value				0.243	Data appear Lognormal at 5% Significance Level								
321	Data appear Lognormal at 5% Significance Level													
322														
323	Lognormal Statistics													
324	Minimum of Logged Data				4.099	Mean of logged Data				4.992				
325	Maximum of Logged Data				6.516	SD of logged Data				0.686				
326														
327	Assuming Lognormal Distribution													
328	95% H-UCL				305.8	90% Chebyshev (MVUE) UCL				294.7				
329	95% Chebyshev (MVUE) UCL				345.7	97.5% Chebyshev (MVUE) UCL				416.5				
330	99% Chebyshev (MVUE) UCL				555.6									
331														
332	Nonparametric Distribution Free UCL Statistics													
333	Data appear to follow a Discernible Distribution at 5% Significance Level													
334														
335	Nonparametric Distribution Free UCLs													
336	95% CLT UCL				273	95% Jackknife UCL				280.6				
337	95% Standard Bootstrap UCL				268.5	95% Bootstrap-t UCL				420				
338	95% Hall's Bootstrap UCL				663.4	95% Percentile Bootstrap UCL				280.6				
339	95% BCA Bootstrap UCL				316.1									
340	90% Chebyshev(Mean, Sd) UCL				341.2	95% Chebyshev(Mean, Sd) UCL				409.6				
341	97.5% Chebyshev(Mean, Sd) UCL				504.5	99% Chebyshev(Mean, Sd) UCL				691				
342														
343	Suggested UCL to Use													
344	95% H-UCL				305.8									
345														
346	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.													
347	Recommendations are based upon data size, data distribution, and skewness.													
348	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).													
349	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.													
350														
351	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.													
352	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.													
353	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.													
354	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.													
355														
356														
357	Chromium													
358														
359	General Statistics													
360	Total Number of Observations				12	Number of Distinct Observations				11				
361						Number of Missing Observations				0				
362	Minimum				9.3	Mean				19.8				
363	Maximum				46.6	Median				17.8				
364	SD				10.2	Std. Error of Mean				2.945				
365	Coefficient of Variation				0.515	Skewness				1.759				
366														
367	Normal GOF Test													
368	Shapiro Wilk Test Statistic				0.841	Shapiro Wilk GOF Test								
369	5% Shapiro Wilk Critical Value				0.859	Data Not Normal at 5% Significance Level								
370	Lilliefors Test Statistic				0.192	Lilliefors GOF Test								
371	5% Lilliefors Critical Value				0.243	Data appear Normal at 5% Significance Level								

	A	B	C	D	E	F	G	H	I	J	K	L
372	<b>Data appear Approximate Normal at 5% Significance Level</b>											
373												
374	<b>Assuming Normal Distribution</b>											
375	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
376	95% Student's-t UCL				25.09		95% Adjusted-CLT UCL (Chen-1995)				26.24	
377							95% Modified-t UCL (Johnson-1978)				25.34	
378												
379	<b>Gamma GOF Test</b>											
380	A-D Test Statistic				0.283		<b>Anderson-Darling Gamma GOF Test</b>					
381	5% A-D Critical Value				0.732		Detected data appear Gamma Distributed at 5% Significance Level					
382	K-S Test Statistic				0.127		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
383	5% K-S Critical Value				0.246		Detected data appear Gamma Distributed at 5% Significance Level					
384	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
385												
386	<b>Gamma Statistics</b>											
387	k hat (MLE)				5.139		k star (bias corrected MLE)				3.91	
388	Theta hat (MLE)				3.853		Theta star (bias corrected MLE)				5.064	
389	nu hat (MLE)				123.3		nu star (bias corrected)				93.84	
390	MLE Mean (bias corrected)				19.8		MLE Sd (bias corrected)				10.01	
391							Approximate Chi Square Value (0.05)				72.5	
392	Adjusted Level of Significance				0.029		Adjusted Chi Square Value				69.64	
393												
394	<b>Assuming Gamma Distribution</b>											
395	95% Approximate Gamma UCL (use when n>=50))				25.63		95% Adjusted Gamma UCL (use when n<50)				26.68	
396												
397	<b>Lognormal GOF Test</b>											
398	Shapiro Wilk Test Statistic				0.967		<b>Shapiro Wilk Lognormal GOF Test</b>					
399	5% Shapiro Wilk Critical Value				0.859		Data appear Lognormal at 5% Significance Level					
400	Lilliefors Test Statistic				0.101		<b>Lilliefors Lognormal GOF Test</b>					
401	5% Lilliefors Critical Value				0.243		Data appear Lognormal at 5% Significance Level					
402	<b>Data appear Lognormal at 5% Significance Level</b>											
403												
404	<b>Lognormal Statistics</b>											
405	Minimum of Logged Data				2.23		Mean of logged Data				2.885	
406	Maximum of Logged Data				3.842		SD of logged Data				0.453	
407												
408	<b>Assuming Lognormal Distribution</b>											
409	95% H-UCL				26.38		90% Chebyshev (MVUE) UCL				27.53	
410	95% Chebyshev (MVUE) UCL				31.09		97.5% Chebyshev (MVUE) UCL				36.04	
411	99% Chebyshev (MVUE) UCL				45.75							
412												
413	<b>Nonparametric Distribution Free UCL Statistics</b>											
414	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
415												
416	<b>Nonparametric Distribution Free UCLs</b>											
417	95% CLT UCL				24.64		95% Jackknife UCL				25.09	
418	95% Standard Bootstrap UCL				24.47		95% Bootstrap-t UCL				28.29	
419	95% Hall's Bootstrap UCL				46.33		95% Percentile Bootstrap UCL				24.76	
420	95% BCA Bootstrap UCL				25.82							
421	90% Chebyshev(Mean, Sd) UCL				28.63		95% Chebyshev(Mean, Sd) UCL				32.64	
422	97.5% Chebyshev(Mean, Sd) UCL				38.19		99% Chebyshev(Mean, Sd) UCL				49.1	
423												
424	<b>Suggested UCL to Use</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
425	95% Student's-t UCL					25.09						
426												
427	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
428	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
429												
430	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
431	Recommendations are based upon data size, data distribution, and skewness.											
432	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
433	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
434												
435												
436	<b>Cobalt</b>											
437												
438	<b>General Statistics</b>											
439	Total Number of Observations				12		Number of Distinct Observations				10	
440							Number of Missing Observations				0	
441	Minimum				2.1		Mean				5.492	
442	Maximum				14.4		Median				4.25	
443	SD				3.262		Std. Error of Mean				0.942	
444	Coefficient of Variation				0.594		Skewness				2.039	
445												
446	<b>Normal GOF Test</b>											
447	Shapiro Wilk Test Statistic				0.795		<b>Shapiro Wilk GOF Test</b>					
448	5% Shapiro Wilk Critical Value				0.859		Data Not Normal at 5% Significance Level					
449	Lilliefors Test Statistic				0.226		<b>Lilliefors GOF Test</b>					
450	5% Lilliefors Critical Value				0.243		Data appear Normal at 5% Significance Level					
451	<b>Data appear Approximate Normal at 5% Significance Level</b>											
452												
453	<b>Assuming Normal Distribution</b>											
454	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
455	95% Student's-t UCL				7.183		95% Adjusted-CLT UCL (Chen-1995)				7.633	
456							95% Modified-t UCL (Johnson-1978)				7.275	
457												
458	<b>Gamma GOF Test</b>											
459	A-D Test Statistic				0.444		<b>Anderson-Darling Gamma GOF Test</b>					
460	5% A-D Critical Value				0.735		Detected data appear Gamma Distributed at 5% Significance Level					
461	K-S Test Statistic				0.204		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
462	5% K-S Critical Value				0.246		Detected data appear Gamma Distributed at 5% Significance Level					
463	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
464												
465	<b>Gamma Statistics</b>											
466	k hat (MLE)				4.093		k star (bias corrected MLE)				3.125	
467	Theta hat (MLE)				1.342		Theta star (bias corrected MLE)				1.757	
468	nu hat (MLE)				98.23		nu star (bias corrected)				75.01	
469	MLE Mean (bias corrected)				5.492		MLE Sd (bias corrected)				3.106	
470							Approximate Chi Square Value (0.05)				56.06	
471	Adjusted Level of Significance				0.029		Adjusted Chi Square Value				53.57	
472												
473	<b>Assuming Gamma Distribution</b>											
474	95% Approximate Gamma UCL (use when n>=50)				7.348		95% Adjusted Gamma UCL (use when n<50)				7.69	
475												
476	<b>Lognormal GOF Test</b>											
477	Shapiro Wilk Test Statistic				0.957		<b>Shapiro Wilk Lognormal GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
478	5% Shapiro Wilk Critical Value					0.859	Data appear Lognormal at 5% Significance Level					
479	Lilliefors Test Statistic					0.175	Lilliefors Lognormal GOF Test					
480	5% Lilliefors Critical Value					0.243	Data appear Lognormal at 5% Significance Level					
481	Data appear Lognormal at 5% Significance Level											
482												
483	Lognormal Statistics											
484	Minimum of Logged Data					0.742	Mean of logged Data					1.576
485	Maximum of Logged Data					2.667	SD of logged Data					0.508
486												
487	Assuming Lognormal Distribution											
488	95% H-UCL					7.651	90% Chebyshev (MVUE) UCL					7.89
489	95% Chebyshev (MVUE) UCL					9	97.5% Chebyshev (MVUE) UCL					10.54
490	99% Chebyshev (MVUE) UCL					13.57						
491												
492	Nonparametric Distribution Free UCL Statistics											
493	Data appear to follow a Discernible Distribution at 5% Significance Level											
494												
495	Nonparametric Distribution Free UCLs											
496	95% CLT UCL					7.041	95% Jackknife UCL					7.183
497	95% Standard Bootstrap UCL					6.993	95% Bootstrap-t UCL					8.304
498	95% Hall's Bootstrap UCL					14.72	95% Percentile Bootstrap UCL					7.083
499	95% BCA Bootstrap UCL					7.625						
500	90% Chebyshev(Mean, Sd) UCL					8.317	95% Chebyshev(Mean, Sd) UCL					9.597
501	97.5% Chebyshev(Mean, Sd) UCL					11.37	99% Chebyshev(Mean, Sd) UCL					14.86
502												
503	Suggested UCL to Use											
504	95% Student's-t UCL					7.183						
505												
506	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
507	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
508												
509	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
510	Recommendations are based upon data size, data distribution, and skewness.											
511	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
512	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
513												
514												
515	Copper											
516												
517	General Statistics											
518	Total Number of Observations					12	Number of Distinct Observations					12
519							Number of Missing Observations					0
520	Minimum					30.8	Mean					100.4
521	Maximum					545	Median					60.4
522	SD					141.3	Std. Error of Mean					40.8
523	Coefficient of Variation					1.407	Skewness					3.351
524												
525	Normal GOF Test											
526	Shapiro Wilk Test Statistic					0.451	Shapiro Wilk GOF Test					
527	5% Shapiro Wilk Critical Value					0.859	Data Not Normal at 5% Significance Level					
528	Lilliefors Test Statistic					0.414	Lilliefors GOF Test					
529	5% Lilliefors Critical Value					0.243	Data Not Normal at 5% Significance Level					
530	Data Not Normal at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L	
531													
532	<b>Assuming Normal Distribution</b>												
533	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
534	95% Student's-t UCL					173.7	95% Adjusted-CLT UCL (Chen-1995)					209.7	
535							95% Modified-t UCL (Johnson-1978)					180.3	
536													
537	<b>Gamma GOF Test</b>												
538	A-D Test Statistic				1.848	<b>Anderson-Darling Gamma GOF Test</b>							
539	5% A-D Critical Value				0.746	Data Not Gamma Distributed at 5% Significance Level							
540	K-S Test Statistic				0.375	<b>Kolmogorov-Smirnov Gamma GOF Test</b>							
541	5% K-S Critical Value				0.25	Data Not Gamma Distributed at 5% Significance Level							
542	<b>Data Not Gamma Distributed at 5% Significance Level</b>												
543													
544	<b>Gamma Statistics</b>												
545	k hat (MLE)				1.467	k star (bias corrected MLE)					1.156		
546	Theta hat (MLE)				68.45	Theta star (bias corrected MLE)					86.88		
547	nu hat (MLE)				35.22	nu star (bias corrected)					27.75		
548	MLE Mean (bias corrected)				100.4	MLE Sd (bias corrected)					93.41		
549						Approximate Chi Square Value (0.05)					16.73		
550	Adjusted Level of Significance				0.029	Adjusted Chi Square Value					15.44		
551													
552	<b>Assuming Gamma Distribution</b>												
553	95% Approximate Gamma UCL (use when n>=50))				166.6	95% Adjusted Gamma UCL (use when n<50)					180.5		
554													
555	<b>Lognormal GOF Test</b>												
556	Shapiro Wilk Test Statistic				0.756	<b>Shapiro Wilk Lognormal GOF Test</b>							
557	5% Shapiro Wilk Critical Value				0.859	Data Not Lognormal at 5% Significance Level							
558	Lilliefors Test Statistic				0.312	<b>Lilliefors Lognormal GOF Test</b>							
559	5% Lilliefors Critical Value				0.243	Data Not Lognormal at 5% Significance Level							
560	<b>Data Not Lognormal at 5% Significance Level</b>												
561													
562	<b>Lognormal Statistics</b>												
563	Minimum of Logged Data				3.428	Mean of logged Data					4.232		
564	Maximum of Logged Data				6.301	SD of logged Data					0.727		
565													
566	<b>Assuming Lognormal Distribution</b>												
567	95% H-UCL			153.6	90% Chebyshev (MVUE) UCL					144.8			
568	95% Chebyshev (MVUE) UCL			170.8	97.5% Chebyshev (MVUE) UCL					207			
569	99% Chebyshev (MVUE) UCL			277.9									
570													
571	<b>Nonparametric Distribution Free UCL Statistics</b>												
572	<b>Data do not follow a Discernible Distribution (0.05)</b>												
573													
574	<b>Nonparametric Distribution Free UCLs</b>												
575	95% CLT UCL			167.5	95% Jackknife UCL					173.7			
576	95% Standard Bootstrap UCL			162.2	95% Bootstrap-t UCL					585.4			
577	95% Hall's Bootstrap UCL			553.7	95% Percentile Bootstrap UCL					181.1			
578	95% BCA Bootstrap UCL			223.5									
579	90% Chebyshev(Mean, Sd) UCL			222.8	95% Chebyshev(Mean, Sd) UCL					278.3			
580	97.5% Chebyshev(Mean, Sd) UCL			355.2	99% Chebyshev(Mean, Sd) UCL					506.3			
581													
582	<b>Suggested UCL to Use</b>												
583	95% Chebyshev (Mean, Sd) UCL			278.3									

	A	B	C	D	E	F	G	H	I	J	K	L
584												
585	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
586	Recommendations are based upon data size, data distribution, and skewness.											
587	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
588	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
589												
590												
591	<b>Lead</b>											
592												
593	<b>General Statistics</b>											
594	Total Number of Observations				12		Number of Distinct Observations				12	
595					Number of Missing Observations				0			
596	Minimum				9.1		Mean				614.5	
597	Maximum				3710		Median				231.5	
598	SD				1056		Std. Error of Mean				304.8	
599	Coefficient of Variation				1.718		Skewness				2.74	
600												
601	<b>Normal GOF Test</b>											
602	Shapiro Wilk Test Statistic				0.58		<b>Shapiro Wilk GOF Test</b>					
603	5% Shapiro Wilk Critical Value				0.859		Data Not Normal at 5% Significance Level					
604	Lilliefors Test Statistic				0.389		<b>Lilliefors GOF Test</b>					
605	5% Lilliefors Critical Value				0.243		Data Not Normal at 5% Significance Level					
606	<b>Data Not Normal at 5% Significance Level</b>											
607												
608	<b>Assuming Normal Distribution</b>											
609	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
610	95% Student's-t UCL				1162		95% Adjusted-CLT UCL (Chen-1995)				1373	
611					95% Modified-t UCL (Johnson-1978)				1202			
612												
613	<b>Gamma GOF Test</b>											
614	A-D Test Statistic				0.585		<b>Anderson-Darling Gamma GOF Test</b>					
615	5% A-D Critical Value				0.776		Detected data appear Gamma Distributed at 5% Significance Level					
616	K-S Test Statistic				0.242		<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
617	5% K-S Critical Value				0.257		Detected data appear Gamma Distributed at 5% Significance Level					
618	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
619												
620	<b>Gamma Statistics</b>											
621	k hat (MLE)				0.613		k star (bias corrected MLE)				0.515	
622	Theta hat (MLE)				1003		Theta star (bias corrected MLE)				1193	
623	nu hat (MLE)				14.7		nu star (bias corrected)				12.36	
624	MLE Mean (bias corrected)				614.5		MLE Sd (bias corrected)				856.3	
625					Approximate Chi Square Value (0.05)				5.464			
626	Adjusted Level of Significance				0.029		Adjusted Chi Square Value				4.783	
627												
628	<b>Assuming Gamma Distribution</b>											
629	95% Approximate Gamma UCL (use when n>=50)				1390		95% Adjusted Gamma UCL (use when n<50)				1588	
630												
631	<b>Lognormal GOF Test</b>											
632	Shapiro Wilk Test Statistic				0.966		<b>Shapiro Wilk Lognormal GOF Test</b>					
633	5% Shapiro Wilk Critical Value				0.859		Data appear Lognormal at 5% Significance Level					
634	Lilliefors Test Statistic				0.173		<b>Lilliefors Lognormal GOF Test</b>					
635	5% Lilliefors Critical Value				0.243		Data appear Lognormal at 5% Significance Level					
636	<b>Data appear Lognormal at 5% Significance Level</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
637												
638	<b>Lognormal Statistics</b>											
639	Minimum of Logged Data				2.208		Mean of logged Data				5.415	
640	Maximum of Logged Data				8.219		SD of logged Data				1.561	
641												
642	<b>Assuming Lognormal Distribution</b>											
643	95% H-UCL				5054		90% Chebyshev (MVUE) UCL				1573	
644	95% Chebyshev (MVUE) UCL				1998		97.5% Chebyshev (MVUE) UCL				2589	
645	99% Chebyshev (MVUE) UCL				3749							
646												
647	<b>Nonparametric Distribution Free UCL Statistics</b>											
648	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
649												
650	<b>Nonparametric Distribution Free UCLs</b>											
651	95% CLT UCL				1116		95% Jackknife UCL				1162	
652	95% Standard Bootstrap UCL				1093		95% Bootstrap-t UCL				3685	
653	95% Hall's Bootstrap UCL				3640		95% Percentile Bootstrap UCL				1152	
654	95% BCA Bootstrap UCL				1489							
655	90% Chebyshev (Mean, Sd) UCL				1529		95% Chebyshev (Mean, Sd) UCL				1943	
656	97.5% Chebyshev (Mean, Sd) UCL				2518		99% Chebyshev (Mean, Sd) UCL				3647	
657												
658	<b>Suggested UCL to Use</b>											
659	95% Adjusted Gamma UCL				1588							
660												
661	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
662	Recommendations are based upon data size, data distribution, and skewness.											
663	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
664	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
665												
666												
667	<b>Manganese</b>											
668												
669	<b>General Statistics</b>											
670	Total Number of Observations				12		Number of Distinct Observations				12	
671							Number of Missing Observations				0	
672	Minimum				259		Mean				690.6	
673	Maximum				2280		Median				479.5	
674	SD				609.3		Std. Error of Mean				175.9	
675	Coefficient of Variation				0.882		Skewness				2.099	
676												
677	<b>Normal GOF Test</b>											
678	Shapiro Wilk Test Statistic				0.688		<b>Shapiro Wilk GOF Test</b>					
679	5% Shapiro Wilk Critical Value				0.859		Data Not Normal at 5% Significance Level					
680	Lilliefors Test Statistic				0.358		<b>Lilliefors GOF Test</b>					
681	5% Lilliefors Critical Value				0.243		Data Not Normal at 5% Significance Level					
682	<b>Data Not Normal at 5% Significance Level</b>											
683												
684	<b>Assuming Normal Distribution</b>											
685	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>					
686	95% Student's-t UCL				1006		95% Adjusted-CLT UCL (Chen-1995)				1094	
687							95% Modified-t UCL (Johnson-1978)				1024	
688												
689	<b>Gamma GOF Test</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
690	A-D Test Statistic					0.976	<b>Anderson-Darling Gamma GOF Test</b>					
691	5% A-D Critical Value					0.741	Data Not Gamma Distributed at 5% Significance Level					
692	K-S Test Statistic					0.276	<b>Kolmogorov-Smirnov Gamma GOF Test</b>					
693	5% K-S Critical Value					0.248	Data Not Gamma Distributed at 5% Significance Level					
694	<b>Data Not Gamma Distributed at 5% Significance Level</b>											
695												
696	<b>Gamma Statistics</b>											
697	k hat (MLE)					2.2	k star (bias corrected MLE)					1.705
698	Theta hat (MLE)					313.9	Theta star (bias corrected MLE)					404.9
699	nu hat (MLE)					52.8	nu star (bias corrected)					40.93
700	MLE Mean (bias corrected)					690.6	MLE Sd (bias corrected)					528.8
701							Approximate Chi Square Value (0.05)					27.27
702	Adjusted Level of Significance					0.029	Adjusted Chi Square Value					25.58
703												
704	<b>Assuming Gamma Distribution</b>											
705	95% Approximate Gamma UCL (use when n>=50))					1037	95% Adjusted Gamma UCL (use when n<50)					1105
706												
707	<b>Lognormal GOF Test</b>											
708	Shapiro Wilk Test Statistic					0.869	<b>Shapiro Wilk Lognormal GOF Test</b>					
709	5% Shapiro Wilk Critical Value					0.859	Data appear Lognormal at 5% Significance Level					
710	Lilliefors Test Statistic					0.222	<b>Lilliefors Lognormal GOF Test</b>					
711	5% Lilliefors Critical Value					0.243	Data appear Lognormal at 5% Significance Level					
712	<b>Data appear Lognormal at 5% Significance Level</b>											
713												
714	<b>Lognormal Statistics</b>											
715	Minimum of Logged Data					5.557	Mean of logged Data					6.293
716	Maximum of Logged Data					7.732	SD of logged Data					0.668
717												
718	<b>Assuming Lognormal Distribution</b>											
719	95% H-UCL					1089	90% Chebyshev (MVUE) UCL					1059
720	95% Chebyshev (MVUE) UCL					1239	97.5% Chebyshev (MVUE) UCL					1489
721	99% Chebyshev (MVUE) UCL					1980						
722												
723	<b>Nonparametric Distribution Free UCL Statistics</b>											
724	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
725												
726	<b>Nonparametric Distribution Free UCLs</b>											
727	95% CLT UCL					979.9	95% Jackknife UCL					1006
728	95% Standard Bootstrap UCL					963.8	95% Bootstrap-t UCL					1705
729	95% Hall's Bootstrap UCL					2631	95% Percentile Bootstrap UCL					990.8
730	95% BCA Bootstrap UCL					1098						
731	90% Chebyshev(Mean, Sd) UCL					1218	95% Chebyshev(Mean, Sd) UCL					1457
732	97.5% Chebyshev(Mean, Sd) UCL					1789	99% Chebyshev(Mean, Sd) UCL					2441
733												
734	<b>Suggested UCL to Use</b>											
735	95% H-UCL					1089						
736												
737	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
738	Recommendations are based upon data size, data distribution, and skewness.											
739	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
740	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
741												
742	<b>ProUCL computes and outputs H-statistic based UCLs for historical reasons only.</b>											



	A	B	C	D	E	F	G	H	I	J	K	L	
743	<b>H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.</b>												
744	<b>It is therefore recommended to avoid the use of H-statistic based 95% UCLs.</b>												
745	<b>Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.</b>												
746													
747													
748	<b>Mercury</b>												
749													
750	<b>General Statistics</b>												
751	Total Number of Observations				12		Number of Distinct Observations				12		
752									Number of Missing Observations				0
753	Minimum				0.033		Mean				0.332		
754	Maximum				0.821		Median				0.244		
755	SD				0.265		Std. Error of Mean				0.0765		
756	Coefficient of Variation				0.799		Skewness				0.972		
757													
758	<b>Normal GOF Test</b>												
759	Shapiro Wilk Test Statistic				0.856		<b>Shapiro Wilk GOF Test</b>						
760	5% Shapiro Wilk Critical Value				0.859		Data Not Normal at 5% Significance Level						
761	Lilliefors Test Statistic				0.254		<b>Lilliefors GOF Test</b>						
762	5% Lilliefors Critical Value				0.243		Data Not Normal at 5% Significance Level						
763	<b>Data Not Normal at 5% Significance Level</b>												
764													
765	<b>Assuming Normal Distribution</b>												
766	<b>95% Normal UCL</b>						<b>95% UCLs (Adjusted for Skewness)</b>						
767	95% Student's-t UCL				0.469		95% Adjusted-CLT UCL (Chen-1995)				0.481		
768									95% Modified-t UCL (Johnson-1978)				0.473
769													
770	<b>Gamma GOF Test</b>												
771	A-D Test Statistic				0.387		<b>Anderson-Darling Gamma GOF Test</b>						
772	5% A-D Critical Value				0.745		Detected data appear Gamma Distributed at 5% Significance Level						
773	K-S Test Statistic				0.146		<b>Kolmogorov-Smirnov Gamma GOF Test</b>						
774	5% K-S Critical Value				0.249		Detected data appear Gamma Distributed at 5% Significance Level						
775	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>												
776													
777	<b>Gamma Statistics</b>												
778	k hat (MLE)				1.515		k star (bias corrected MLE)				1.192		
779	Theta hat (MLE)				0.219		Theta star (bias corrected MLE)				0.278		
780	nu hat (MLE)				36.36		nu star (bias corrected)				28.6		
781	MLE Mean (bias corrected)				0.332		MLE Sd (bias corrected)				0.304		
782									Approximate Chi Square Value (0.05)				17.4
783	Adjusted Level of Significance				0.029		Adjusted Chi Square Value				16.07		
784													
785	<b>Assuming Gamma Distribution</b>												
786	95% Approximate Gamma UCL (use when n>=50)				0.546		95% Adjusted Gamma UCL (use when n<50)				0.59		
787													
788	<b>Lognormal GOF Test</b>												
789	Shapiro Wilk Test Statistic				0.904		<b>Shapiro Wilk Lognormal GOF Test</b>						
790	5% Shapiro Wilk Critical Value				0.859		Data appear Lognormal at 5% Significance Level						
791	Lilliefors Test Statistic				0.193		<b>Lilliefors Lognormal GOF Test</b>						
792	5% Lilliefors Critical Value				0.243		Data appear Lognormal at 5% Significance Level						
793	<b>Data appear Lognormal at 5% Significance Level</b>												
794													
795	<b>Lognormal Statistics</b>												

	A	B	C	D	E	F	G	H	I	J	K	L
796	Minimum of Logged Data					-3.411	Mean of logged Data					-1.468
797	Maximum of Logged Data					-0.197	SD of logged Data					0.999
798												
799	<b>Assuming Lognormal Distribution</b>											
800	95% H-UCL					0.912	90% Chebyshev (MVUE) UCL					0.69
801	95% Chebyshev (MVUE) UCL					0.841	97.5% Chebyshev (MVUE) UCL					1.049
802	99% Chebyshev (MVUE) UCL					1.459						
803												
804	<b>Nonparametric Distribution Free UCL Statistics</b>											
805	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>											
806												
807	<b>Nonparametric Distribution Free UCLs</b>											
808	95% CLT UCL					0.458	95% Jackknife UCL					0.469
809	95% Standard Bootstrap UCL					0.452	95% Bootstrap-t UCL					0.516
810	95% Hall's Bootstrap UCL					0.474	95% Percentile Bootstrap UCL					0.455
811	95% BCA Bootstrap UCL					0.47						
812	90% Chebyshev(Mean, Sd) UCL					0.561	95% Chebyshev(Mean, Sd) UCL					0.665
813	97.5% Chebyshev(Mean, Sd) UCL					0.81	99% Chebyshev(Mean, Sd) UCL					1.093
814												
815	<b>Suggested UCL to Use</b>											
816	95% Adjusted Gamma UCL					0.59						
817												
818	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
819	Recommendations are based upon data size, data distribution, and skewness.											
820	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
821	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
822												
823	<b>Thallium</b>											
824												
825	<b>General Statistics</b>											
826	Total Number of Observations					12	Number of Distinct Observations					6
827	Number of Detects					4	Number of Non-Detects					8
828	Number of Distinct Detects					4	Number of Distinct Non-Detects					2
829	Minimum Detect					0.8	Minimum Non-Detect					1.1
830	Maximum Detect					3.5	Maximum Non-Detect					1.2
831	Variance Detects					1.576	Percent Non-Detects					66.67%
832	Mean Detects					1.675	SD Detects					1.255
833	Median Detects					1.2	CV Detects					0.749
834	Skewness Detects					1.664	Kurtosis Detects					2.663
835	Mean of Logged Detects					0.332	SD of Logged Detects					0.671
836												
837	<b>Normal GOF Test on Detects Only</b>											
838	Shapiro Wilk Test Statistic					0.809	<b>Shapiro Wilk GOF Test</b>					
839	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Normal at 5% Significance Level					
840	Lilliefors Test Statistic					0.305	<b>Lilliefors GOF Test</b>					
841	5% Lilliefors Critical Value					0.375	Detected Data appear Normal at 5% Significance Level					
842	<b>Detected Data appear Normal at 5% Significance Level</b>											
843												
844	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
845	KM Mean					1.125	KM Standard Error of Mean					0.248
846	KM SD					0.74	95% KM (BCA) UCL					N/A
847	95% KM (t) UCL					1.571	95% KM (Percentile Bootstrap) UCL					N/A
848	95% KM (z) UCL					1.534	95% KM Bootstrap t UCL					N/A

	A	B	C	D	E	F	G	H	I	J	K	L
849	90% KM Chebyshev UCL					1.87	95% KM Chebyshev UCL					2.208
850	97.5% KM Chebyshev UCL					2.676	99% KM Chebyshev UCL					3.596
851												
852	<b>Gamma GOF Tests on Detected Observations Only</b>											
853	A-D Test Statistic					0.42	<b>Anderson-Darling GOF Test</b>					
854	5% A-D Critical Value					0.66	Detected data appear Gamma Distributed at 5% Significance Level					
855	K-S Test Statistic					0.273	<b>Kolmogorov-Smirnov GOF</b>					
856	5% K-S Critical Value					0.397	Detected data appear Gamma Distributed at 5% Significance Level					
857	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
858												
859	<b>Gamma Statistics on Detected Data Only</b>											
860	k hat (MLE)					2.882	k star (bias corrected MLE)					0.887
861	Theta hat (MLE)					0.581	Theta star (bias corrected MLE)					1.888
862	nu hat (MLE)					23.06	nu star (bias corrected)					7.098
863	Mean (detects)					1.675						
864												
865	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
866	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
867	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
868	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
869	This is especially true when the sample size is small.											
870	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
871	Minimum					0.147	Mean					1.085
872	Maximum					3.5	Median					0.896
873	SD					0.865	CV					0.797
874	k hat (MLE)					2.086	k star (bias corrected MLE)					1.62
875	Theta hat (MLE)					0.52	Theta star (bias corrected MLE)					0.67
876	nu hat (MLE)					50.06	nu star (bias corrected)					38.88
877	Adjusted Level of Significance ( $\beta$ )					0.029						
878	Approximate Chi Square Value (38.88, $\alpha$ )					25.6	Adjusted Chi Square Value (38.88, $\beta$ )					23.96
879	95% Gamma Approximate UCL (use when $n \geq 50$ )					1.648	95% Gamma Adjusted UCL (use when $n < 50$ )					N/A
880												
881	<b>Estimates of Gamma Parameters using KM Estimates</b>											
882	Mean (KM)					1.125	SD (KM)					0.74
883	Variance (KM)					0.547	SE of Mean (KM)					0.248
884	k hat (KM)					2.314	k star (KM)					1.791
885	nu hat (KM)					55.54	nu star (KM)					42.99
886	theta hat (KM)					0.486	theta star (KM)					0.628
887	80% gamma percentile (KM)					1.706	90% gamma percentile (KM)					2.246
888	95% gamma percentile (KM)					2.764	99% gamma percentile (KM)					3.922
889												
890	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
891	Approximate Chi Square Value (42.99, $\alpha$ )					28.96	Adjusted Chi Square Value (42.99, $\beta$ )					27.21
892	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					1.67	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					1.778
893												
894	<b>Lognormal GOF Test on Detected Observations Only</b>											
895	Shapiro Wilk Test Statistic					0.894	<b>Shapiro Wilk GOF Test</b>					
896	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Lognormal at 5% Significance Level					
897	Lilliefors Test Statistic					0.243	<b>Lilliefors GOF Test</b>					
898	5% Lilliefors Critical Value					0.375	Detected Data appear Lognormal at 5% Significance Level					
899	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
900												
901	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											

	A	B	C	D	E	F	G	H	I	J	K	L	
902				Mean in Original Scale		1.147				Mean in Log Scale		-0.00629	
903				SD in Original Scale		0.799				SD in Log Scale		0.513	
904			95% t UCL (assumes normality of ROS data)			1.561				95% Percentile Bootstrap UCL		1.553	
905				95% BCA Bootstrap UCL		1.773				95% Bootstrap t UCL		2.132	
906				95% H-UCL (Log ROS)		1.582							
907													
908				<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>									
909				KM Mean (logged)		0.00131				KM Geo Mean		1.001	
910				KM SD (logged)		0.412				95% Critical H Value (KM-Log)		2.039	
911				KM Standard Error of Mean (logged)		0.142				95% H-UCL (KM -Log)		1.404	
912				KM SD (logged)		0.412				95% Critical H Value (KM-Log)		2.039	
913				KM Standard Error of Mean (logged)		0.142							
914													
915				<b>DL/2 Statistics</b>									
916				<b>DL/2 Normal</b>				<b>DL/2 Log-Transformed</b>					
917				Mean in Original Scale		0.933				Mean in Log Scale		-0.273	
918				SD in Original Scale		0.854				SD in Log Scale		0.569	
919				95% t UCL (Assumes normality)		1.376				95% H-Stat UCL		1.312	
920				<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>									
921													
922				<b>Nonparametric Distribution Free UCL Statistics</b>									
923				<b>Detected Data appear Normal Distributed at 5% Significance Level</b>									
924													
925				<b>Suggested UCL to Use</b>									
926				95% KM (t) UCL		1.571							
927													
928				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
929				Recommendations are based upon data size, data distribution, and skewness.									
930				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).									
931				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.									
932													
933				<b>Benzo(a)anthracene</b>									
934													
935				<b>General Statistics</b>									
936				Total Number of Observations		12				Number of Distinct Observations		12	
937				Number of Detects		11				Number of Non-Detects		1	
938				Number of Distinct Detects		11				Number of Distinct Non-Detects		1	
939				Minimum Detect		0.15				Minimum Non-Detect		0.37	
940				Maximum Detect		29				Maximum Non-Detect		0.37	
941				Variance Detects		99.26				Percent Non-Detects		8.333%	
942				Mean Detects		6.554				SD Detects		9.963	
943				Median Detects		1.5				CV Detects		1.52	
944				Skewness Detects		1.8				Kurtosis Detects		2.045	
945				Mean of Logged Detects		0.782				SD of Logged Detects		1.64	
946													
947				<b>Normal GOF Test on Detects Only</b>									
948				Shapiro Wilk Test Statistic		0.671				<b>Shapiro Wilk GOF Test</b>			
949				5% Shapiro Wilk Critical Value		0.85				Detected Data Not Normal at 5% Significance Level			
950				Lilliefors Test Statistic		0.313				<b>Lilliefors GOF Test</b>			
951				5% Lilliefors Critical Value		0.251				Detected Data Not Normal at 5% Significance Level			
952				<b>Detected Data Not Normal at 5% Significance Level</b>									
953													
954				<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>									

	A	B	C	D	E	F	G	H	I	J	K	L
955					KM Mean	6.027				KM Standard Error of Mean		2.804
956					KM SD	9.261				95% KM (BCA) UCL		10.7
957					95% KM (t) UCL	11.06				95% KM (Percentile Bootstrap) UCL		10.73
958					95% KM (z) UCL	10.64				95% KM Bootstrap t UCL		24.92
959					90% KM Chebyshev UCL	14.44				95% KM Chebyshev UCL		18.25
960					97.5% KM Chebyshev UCL	23.54				99% KM Chebyshev UCL		33.93
961												
962	<b>Gamma GOF Tests on Detected Observations Only</b>											
963					A-D Test Statistic	0.549				<b>Anderson-Darling GOF Test</b>		
964					5% A-D Critical Value	0.776			Detected data appear Gamma Distributed at 5% Significance Level			
965					K-S Test Statistic	0.217			<b>Kolmogorov-Smirnov GOF</b>			
966					5% K-S Critical Value	0.268			Detected data appear Gamma Distributed at 5% Significance Level			
967	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
968												
969	<b>Gamma Statistics on Detected Data Only</b>											
970					k hat (MLE)	0.568				k star (bias corrected MLE)		0.473
971					Theta hat (MLE)	11.55				Theta star (bias corrected MLE)		13.84
972					nu hat (MLE)	12.49				nu star (bias corrected)		10.41
973					Mean (detects)	6.554						
974												
975	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
976	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
977	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
978	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
979	This is especially true when the sample size is small.											
980	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
981					Minimum	0.01				Mean		6.008
982					Maximum	29				Median		1.4
983					SD	9.685				CV		1.612
984					k hat (MLE)	0.443				k star (bias corrected MLE)		0.388
985					Theta hat (MLE)	13.55				Theta star (bias corrected MLE)		15.48
986					nu hat (MLE)	10.64				nu star (bias corrected)		9.315
987					Adjusted Level of Significance ( $\beta$ )	0.029						
988					Approximate Chi Square Value (9.31, $\alpha$ )	3.518				Adjusted Chi Square Value (9.31, $\beta$ )		2.996
989					95% Gamma Approximate UCL (use when $n \geq 50$ )	15.91				95% Gamma Adjusted UCL (use when $n < 50$ )		18.68
990												
991	<b>Estimates of Gamma Parameters using KM Estimates</b>											
992					Mean (KM)	6.027				SD (KM)		9.261
993					Variance (KM)	85.77				SE of Mean (KM)		2.804
994					k hat (KM)	0.423				k star (KM)		0.373
995					nu hat (KM)	10.16				nu star (KM)		8.956
996					theta hat (KM)	14.23				theta star (KM)		16.15
997					80% gamma percentile (KM)	9.639				90% gamma percentile (KM)		17.23
998					95% gamma percentile (KM)	25.64				99% gamma percentile (KM)		46.97
999												
1000	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1001					Approximate Chi Square Value (8.96, $\alpha$ )	3.3				Adjusted Chi Square Value (8.96, $\beta$ )		2.798
1002					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	16.35				95% Gamma Adjusted KM-UCL (use when $n < 50$ )		19.29
1003												
1004	<b>Lognormal GOF Test on Detected Observations Only</b>											
1005					Shapiro Wilk Test Statistic	0.963				<b>Shapiro Wilk GOF Test</b>		
1006					5% Shapiro Wilk Critical Value	0.85			Detected Data appear Lognormal at 5% Significance Level			
1007					Lilliefors Test Statistic	0.136			<b>Lilliefors GOF Test</b>			

	A	B	C	D	E	F	G	H	I	J	K	L
1008	5% Lilliefors Critical Value				0.251	Detected Data appear Lognormal at 5% Significance Level						
1009	Detected Data appear Lognormal at 5% Significance Level											
1010												
1011	Lognormal ROS Statistics Using Imputed Non-Detects											
1012	Mean in Original Scale				6.024	Mean in Log Scale				0.583		
1013	SD in Original Scale				9.675	SD in Log Scale				1.709		
1014	95% t UCL (assumes normality of ROS data)				11.04	95% Percentile Bootstrap UCL				10.76		
1015	95% BCA Bootstrap UCL				12.68	95% Bootstrap t UCL				23.88		
1016	95% H-UCL (Log ROS)				72.04							
1017												
1018	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1019	KM Mean (logged)				0.589	KM Geo Mean				1.803		
1020	KM SD (logged)				1.632	95% Critical H Value (KM-Log)				4.17		
1021	KM Standard Error of Mean (logged)				0.495	95% H-UCL (KM -Log)				53.08		
1022	KM SD (logged)				1.632	95% Critical H Value (KM-Log)				4.17		
1023	KM Standard Error of Mean (logged)				0.495							
1024												
1025	DL/2 Statistics											
1026	DL/2 Normal						DL/2 Log-Transformed					
1027	Mean in Original Scale				6.023	Mean in Log Scale				0.577		
1028	SD in Original Scale				9.675	SD in Log Scale				1.718		
1029	95% t UCL (Assumes normality)				11.04	95% H-Stat UCL				74.39		
1030	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1031												
1032	Nonparametric Distribution Free UCL Statistics											
1033	Detected Data appear Gamma Distributed at 5% Significance Level											
1034												
1035	Suggested UCL to Use											
1036	95% KM Bootstrap t UCL				24.92	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				19.29		
1037												
1038	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1039	Recommendations are based upon data size, data distribution, and skewness.											
1040	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1041	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1042												
1043	Benzo(b)fluoranthene											
1044												
1045	General Statistics											
1046	Total Number of Observations				12	Number of Distinct Observations				11		
1047	Number of Detects				11	Number of Non-Detects				1		
1048	Number of Distinct Detects				10	Number of Distinct Non-Detects				1		
1049	Minimum Detect				0.22	Minimum Non-Detect				0.37		
1050	Maximum Detect				30	Maximum Non-Detect				0.37		
1051	Variance Detects				105.7	Percent Non-Detects				8.333%		
1052	Mean Detects				6.957	SD Detects				10.28		
1053	Median Detects				1.6	CV Detects				1.478		
1054	Skewness Detects				1.783	Kurtosis Detects				1.971		
1055	Mean of Logged Detects				0.942	SD of Logged Detects				1.538		
1056												
1057	Normal GOF Test on Detects Only											
1058	Shapiro Wilk Test Statistic				0.676	Shapiro Wilk GOF Test						
1059	5% Shapiro Wilk Critical Value				0.85	Detected Data Not Normal at 5% Significance Level						
1060	Lilliefors Test Statistic				0.329	Lilliefors GOF Test						

	A	B	C	D	E	F	G	H	I	J	K	L	
1061	5% Lilliefors Critical Value					0.251	Detected Data Not Normal at 5% Significance Level						
1062	Detected Data Not Normal at 5% Significance Level												
1063													
1064	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
1065	KM Mean				6.396	KM Standard Error of Mean				2.897			
1066	KM SD				9.569	95% KM (BCA) UCL				11.37			
1067	95% KM (t) UCL				11.6	95% KM (Percentile Bootstrap) UCL				11.42			
1068	95% KM (z) UCL				11.16	95% KM Bootstrap t UCL				24.62			
1069	90% KM Chebyshev UCL				15.09	95% KM Chebyshev UCL				19.02			
1070	97.5% KM Chebyshev UCL				24.49	99% KM Chebyshev UCL				35.22			
1071													
1072	Gamma GOF Tests on Detected Observations Only												
1073	A-D Test Statistic				0.584	Anderson-Darling GOF Test							
1074	5% A-D Critical Value				0.772	Detected data appear Gamma Distributed at 5% Significance Level							
1075	K-S Test Statistic				0.228	Kolmogorov-Smirnov GOF							
1076	5% K-S Critical Value				0.267	Detected data appear Gamma Distributed at 5% Significance Level							
1077	Detected data appear Gamma Distributed at 5% Significance Level												
1078													
1079	Gamma Statistics on Detected Data Only												
1080	k hat (MLE)				0.617	k star (bias corrected MLE)				0.509			
1081	Theta hat (MLE)				11.28	Theta star (bias corrected MLE)				13.66			
1082	nu hat (MLE)				13.57	nu star (bias corrected)				11.2			
1083	Mean (detects)				6.957								
1084													
1085	Gamma ROS Statistics using Imputed Non-Detects												
1086	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1087	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)												
1088	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1089	This is especially true when the sample size is small.												
1090	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1091	Minimum				0.01	Mean				6.378			
1092	Maximum				30	Median				1.6			
1093	SD				10.01	CV				1.569			
1094	k hat (MLE)				0.468	k star (bias corrected MLE)				0.406			
1095	Theta hat (MLE)				13.64	Theta star (bias corrected MLE)				15.7			
1096	nu hat (MLE)				11.22	nu star (bias corrected)				9.749			
1097	Adjusted Level of Significance ( $\beta$ )				0.029								
1098	Approximate Chi Square Value (9.75, $\alpha$ )				3.785	Adjusted Chi Square Value (9.75, $\beta$ )				3.239			
1099	95% Gamma Approximate UCL (use when $n \geq 50$ )				16.43	95% Gamma Adjusted UCL (use when $n < 50$ )				19.2			
1100													
1101	Estimates of Gamma Parameters using KM Estimates												
1102	Mean (KM)				6.396	SD (KM)				9.569			
1103	Variance (KM)				91.57	SE of Mean (KM)				2.897			
1104	k hat (KM)				0.447	k star (KM)				0.391			
1105	nu hat (KM)				10.72	nu star (KM)				9.374			
1106	theta hat (KM)				14.32	theta star (KM)				16.37			
1107	80% gamma percentile (KM)				10.29	90% gamma percentile (KM)				18.14			
1108	95% gamma percentile (KM)				26.79	99% gamma percentile (KM)				48.6			
1109													
1110	Gamma Kaplan-Meier (KM) Statistics												
1111	Approximate Chi Square Value (9.37, $\alpha$ )				3.555	Adjusted Chi Square Value (9.37, $\beta$ )				3.029			
1112	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				16.87	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				19.8			
1113													

	A	B	C	D	E	F	G	H	I	J	K	L
1114	<b>Lognormal GOF Test on Detected Observations Only</b>											
1115	Shapiro Wilk Test Statistic				0.957		<b>Shapiro Wilk GOF Test</b>					
1116	5% Shapiro Wilk Critical Value				0.85		Detected Data appear Lognormal at 5% Significance Level					
1117	Lilliefors Test Statistic				0.166		<b>Lilliefors GOF Test</b>					
1118	5% Lilliefors Critical Value				0.251		Detected Data appear Lognormal at 5% Significance Level					
1119	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1120												
1121	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1122	Mean in Original Scale				6.391		Mean in Log Scale				0.711	
1123	SD in Original Scale				9.998		SD in Log Scale				1.67	
1124	95% t UCL (assumes normality of ROS data)				11.57		95% Percentile Bootstrap UCL				11.51	
1125	95% BCA Bootstrap UCL				13.37		95% Bootstrap t UCL				24.16	
1126	95% H-UCL (Log ROS)				69.95							
1127												
1128	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1129	KM Mean (logged)				0.738		KM Geo Mean				2.091	
1130	KM SD (logged)				1.559		95% Critical H Value (KM-Log)				4.019	
1131	KM Standard Error of Mean (logged)				0.472		95% H-UCL (KM -Log)				46.64	
1132	KM SD (logged)				1.559		95% Critical H Value (KM-Log)				4.019	
1133	KM Standard Error of Mean (logged)				0.472							
1134												
1135	<b>DL/2 Statistics</b>											
1136	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1137	Mean in Original Scale				6.393		Mean in Log Scale				0.723	
1138	SD in Original Scale				9.997		SD in Log Scale				1.651	
1139	95% t UCL (Assumes normality)				11.58		95% H-Stat UCL				65.51	
1140	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1141												
1142	<b>Nonparametric Distribution Free UCL Statistics</b>											
1143	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1144												
1145	<b>Suggested UCL to Use</b>											
1146	95% KM Bootstrap t UCL				24.62		Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				19.8	
1147												
1148	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1149	Recommendations are based upon data size, data distribution, and skewness.											
1150	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1151	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1152												
1153	<b>Benzo(k)fluoranthene</b>											
1154												
1155	<b>General Statistics</b>											
1156	Total Number of Observations				12		Number of Distinct Observations				12	
1157	Number of Detects				10		Number of Non-Detects				2	
1158	Number of Distinct Detects				10		Number of Distinct Non-Detects				2	
1159	Minimum Detect				0.16		Minimum Non-Detect				0.37	
1160	Maximum Detect				13		Maximum Non-Detect				0.39	
1161	Variance Detects				18.45		Percent Non-Detects				16.67%	
1162	Mean Detects				3.026		SD Detects				4.295	
1163	Median Detects				0.87		CV Detects				1.42	
1164	Skewness Detects				1.851		Kurtosis Detects				2.687	
1165	Mean of Logged Detects				0.256		SD of Logged Detects				1.376	
1166												



	A	B	C	D	E	F	G	H	I	J	K	L
1167	<b>Normal GOF Test on Detects Only</b>											
1168	Shapiro Wilk Test Statistic					0.698	<b>Shapiro Wilk GOF Test</b>					
1169	5% Shapiro Wilk Critical Value					0.842	Detected Data Not Normal at 5% Significance Level					
1170	Lilliefors Test Statistic					0.312	<b>Lilliefors GOF Test</b>					
1171	5% Lilliefors Critical Value					0.262	Detected Data Not Normal at 5% Significance Level					
1172	<b>Detected Data Not Normal at 5% Significance Level</b>											
1173												
1174	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1175	KM Mean					2.548	KM Standard Error of Mean					1.178
1176	KM SD					3.87	95% KM (BCA) UCL					4.939
1177	95% KM (t) UCL					4.663	95% KM (Percentile Bootstrap) UCL					4.578
1178	95% KM (z) UCL					4.485	95% KM Bootstrap t UCL					9.674
1179	90% KM Chebyshev UCL					6.081	95% KM Chebyshev UCL					7.682
1180	97.5% KM Chebyshev UCL					9.903	99% KM Chebyshev UCL					14.27
1181												
1182	<b>Gamma GOF Tests on Detected Observations Only</b>											
1183	A-D Test Statistic					0.629	<b>Anderson-Darling GOF Test</b>					
1184	5% A-D Critical Value					0.76	Detected data appear Gamma Distributed at 5% Significance Level					
1185	K-S Test Statistic					0.231	<b>Kolmogorov-Smirnov GOF</b>					
1186	5% K-S Critical Value					0.277	Detected data appear Gamma Distributed at 5% Significance Level					
1187	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1188												
1189	<b>Gamma Statistics on Detected Data Only</b>											
1190	k hat (MLE)					0.709	k star (bias corrected MLE)					0.563
1191	Theta hat (MLE)					4.27	Theta star (bias corrected MLE)					5.378
1192	nu hat (MLE)					14.17	nu star (bias corrected)					11.25
1193	Mean (detects)					3.026						
1194												
1195	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1196	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1197	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1198	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1199	This is especially true when the sample size is small.											
1200	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1201	Minimum					0.01	Mean					2.523
1202	Maximum					13	Median					0.635
1203	SD					4.059	CV					1.609
1204	k hat (MLE)					0.438	k star (bias corrected MLE)					0.384
1205	Theta hat (MLE)					5.758	Theta star (bias corrected MLE)					6.568
1206	nu hat (MLE)					10.52	nu star (bias corrected)					9.221
1207	Adjusted Level of Significance ( $\beta$ )					0.029						
1208	Approximate Chi Square Value (9.22, $\alpha$ )					3.461	Adjusted Chi Square Value (9.22, $\beta$ )					2.944
1209	95% Gamma Approximate UCL (use when $n \geq 50$ )					6.723	95% Gamma Adjusted UCL (use when $n < 50$ )					7.905
1210												
1211	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1212	Mean (KM)					2.548	SD (KM)					3.87
1213	Variance (KM)					14.98	SE of Mean (KM)					1.178
1214	k hat (KM)					0.434	k star (KM)					0.381
1215	nu hat (KM)					10.41	nu star (KM)					9.137
1216	theta hat (KM)					5.878	theta star (KM)					6.694
1217	80% gamma percentile (KM)					4.087	90% gamma percentile (KM)					7.26
1218	95% gamma percentile (KM)					10.77	99% gamma percentile (KM)					19.64
1219												

	A	B	C	D	E	F	G	H	I	J	K	L
1220	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1221	Approximate Chi Square Value (9.14, $\alpha$ )					3.41	Adjusted Chi Square Value (9.14, $\beta$ )					2.897
1222	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					6.828	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					8.037
1223												
1224	<b>Lognormal GOF Test on Detected Observations Only</b>											
1225	Shapiro Wilk Test Statistic					0.943	<b>Shapiro Wilk GOF Test</b>					
1226	5% Shapiro Wilk Critical Value					0.842	Detected Data appear Lognormal at 5% Significance Level					
1227	Lilliefors Test Statistic					0.195	<b>Lilliefors GOF Test</b>					
1228	5% Lilliefors Critical Value					0.262	Detected Data appear Lognormal at 5% Significance Level					
1229	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1230												
1231	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1232	Mean in Original Scale					2.541	Mean in Log Scale					-0.15
1233	SD in Original Scale					4.047	SD in Log Scale					1.564
1234	95% t UCL (assumes normality of ROS data)					4.639	95% Percentile Bootstrap UCL					4.528
1235	95% BCA Bootstrap UCL					5.262	95% Bootstrap t UCL					9.77
1236	95% H-UCL (Log ROS)					19.56						
1237												
1238	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1239	KM Mean (logged)					-0.0922	KM Geo Mean					0.912
1240	KM SD (logged)					1.423	95% Critical H Value (KM-Log)					3.737
1241	KM Standard Error of Mean (logged)					0.433	95% H-UCL (KM -Log)					12.48
1242	KM SD (logged)					1.423	95% Critical H Value (KM-Log)					3.737
1243	KM Standard Error of Mean (logged)					0.433						
1244												
1245	<b>DL/2 Statistics</b>											
1246	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1247	Mean in Original Scale					2.553	Mean in Log Scale					-0.0636
1248	SD in Original Scale					4.039	SD in Log Scale					1.451
1249	95% t UCL (Assumes normality)					4.647	95% H-Stat UCL					14.14
1250	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1251												
1252	<b>Nonparametric Distribution Free UCL Statistics</b>											
1253	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1254												
1255	<b>Suggested UCL to Use</b>											
1256	95% KM Bootstrap t UCL					9.674	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					8.037
1257												
1258	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1259	Recommendations are based upon data size, data distribution, and skewness.											
1260	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1261	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1262												
1263	<b>Benzo(a)pyrene</b>											
1264												
1265	<b>General Statistics</b>											
1266	Total Number of Observations					12	Number of Distinct Observations					11
1267	Number of Detects					11	Number of Non-Detects					1
1268	Number of Distinct Detects					10	Number of Distinct Non-Detects					1
1269	Minimum Detect					0.16	Minimum Non-Detect					0.37
1270	Maximum Detect					28	Maximum Non-Detect					0.37
1271	Variance Detects					95.05	Percent Non-Detects					8.333%
1272	Mean Detects					6.454	SD Detects					9.749

	A	B	C	D	E	F	G	H	I	J	K	L
1273	Median Detects					1.5	CV Detects					1.511
1274	Skewness Detects					1.768	Kurtosis Detects					1.857
1275	Mean of Logged Detects					0.786	SD of Logged Detects					1.615
1276												
1277	<b>Normal GOF Test on Detects Only</b>											
1278	Shapiro Wilk Test Statistic					0.67	<b>Shapiro Wilk GOF Test</b>					
1279	5% Shapiro Wilk Critical Value					0.85	Detected Data Not Normal at 5% Significance Level					
1280	Lilliefors Test Statistic					0.323	<b>Lilliefors GOF Test</b>					
1281	5% Lilliefors Critical Value					0.251	Detected Data Not Normal at 5% Significance Level					
1282	<b>Detected Data Not Normal at 5% Significance Level</b>											
1283												
1284	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1285	KM Mean					5.936	KM Standard Error of Mean					2.744
1286	KM SD					9.064	95% KM (BCA) UCL					10.86
1287	95% KM (t) UCL					10.86	95% KM (Percentile Bootstrap) UCL					10.58
1288	95% KM (z) UCL					10.45	95% KM Bootstrap t UCL					23.3
1289	90% KM Chebyshev UCL					14.17	95% KM Chebyshev UCL					17.9
1290	97.5% KM Chebyshev UCL					23.07	99% KM Chebyshev UCL					33.24
1291												
1292	<b>Gamma GOF Tests on Detected Observations Only</b>											
1293	A-D Test Statistic					0.589	<b>Anderson-Darling GOF Test</b>					
1294	5% A-D Critical Value					0.775	Detected data appear Gamma Distributed at 5% Significance Level					
1295	K-S Test Statistic					0.217	<b>Kolmogorov-Smirnov GOF</b>					
1296	5% K-S Critical Value					0.268	Detected data appear Gamma Distributed at 5% Significance Level					
1297	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1298												
1299	<b>Gamma Statistics on Detected Data Only</b>											
1300	k hat (MLE)					0.576	k star (bias corrected MLE)					0.48
1301	Theta hat (MLE)					11.2	Theta star (bias corrected MLE)					13.45
1302	nu hat (MLE)					12.68	nu star (bias corrected)					10.55
1303	Mean (detects)					6.454						
1304												
1305	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1306	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1307	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1308	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1309	This is especially true when the sample size is small.											
1310	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1311	Minimum					0.01	Mean					5.917
1312	Maximum					28	Median					1.35
1313	SD					9.48	CV					1.602
1314	k hat (MLE)					0.448	k star (bias corrected MLE)					0.392
1315	Theta hat (MLE)					13.2	Theta star (bias corrected MLE)					15.1
1316	nu hat (MLE)					10.76	nu star (bias corrected)					9.404
1317	Adjusted Level of Significance ( $\beta$ )					0.029						
1318	Approximate Chi Square Value (9.40, $\alpha$ )					3.573	Adjusted Chi Square Value (9.40, $\beta$ )					3.045
1319	95% Gamma Approximate UCL (use when $n \geq 50$ )					15.57	95% Gamma Adjusted UCL (use when $n < 50$ )					18.27
1320												
1321	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1322	Mean (KM)					5.936	SD (KM)					9.064
1323	Variance (KM)					82.15	SE of Mean (KM)					2.744
1324	k hat (KM)					0.429	k star (KM)					0.377
1325	nu hat (KM)					10.3	nu star (KM)					9.055

	A	B	C	D	E	F	G	H	I	J	K	L
1326	theta hat (KM)				13.84	theta star (KM)				15.73		
1327	80% gamma percentile (KM)				9.509	90% gamma percentile (KM)				16.94		
1328	95% gamma percentile (KM)				25.17	99% gamma percentile (KM)				45.99		
1329												
1330	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1331	Approximate Chi Square Value (9.05, $\alpha$ )				3.36	Adjusted Chi Square Value (9.05, $\beta$ )				2.852		
1332	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )				16	95% Gamma Adjusted KM-UCL (use when $n < 50$ )				18.85		
1333												
1334	<b>Lognormal GOF Test on Detected Observations Only</b>											
1335	Shapiro Wilk Test Statistic				0.957	<b>Shapiro Wilk GOF Test</b>						
1336	5% Shapiro Wilk Critical Value				0.85	Detected Data appear Lognormal at 5% Significance Level						
1337	Lilliefors Test Statistic				0.139	<b>Lilliefors GOF Test</b>						
1338	5% Lilliefors Critical Value				0.251	Detected Data appear Lognormal at 5% Significance Level						
1339	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1340												
1341	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1342	Mean in Original Scale				5.933	Mean in Log Scale				0.59		
1343	SD in Original Scale				9.469	SD in Log Scale				1.682		
1344	95% t UCL (assumes normality of ROS data)				10.84	95% Percentile Bootstrap UCL				10.51		
1345	95% BCA Bootstrap UCL				12.02	95% Bootstrap t UCL				24.13		
1346	95% H-UCL (Log ROS)				64.96							
1347												
1348	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1349	KM Mean (logged)				0.598	KM Geo Mean				1.818		
1350	KM SD (logged)				1.604	95% Critical H Value (KM-Log)				4.112		
1351	KM Standard Error of Mean (logged)				0.487	95% H-UCL (KM -Log)				48.08		
1352	KM SD (logged)				1.604	95% Critical H Value (KM-Log)				4.112		
1353	KM Standard Error of Mean (logged)				0.487							
1354												
1355	<b>DL/2 Statistics</b>											
1356	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
1357	Mean in Original Scale				5.931	Mean in Log Scale				0.58		
1358	SD in Original Scale				9.47	SD in Log Scale				1.697		
1359	95% t UCL (Assumes normality)				10.84	95% H-Stat UCL				68.34		
1360	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1361												
1362	<b>Nonparametric Distribution Free UCL Statistics</b>											
1363	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1364												
1365	<b>Suggested UCL to Use</b>											
1366	95% KM Bootstrap t UCL				23.3	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )				18.85		
1367												
1368	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1369	Recommendations are based upon data size, data distribution, and skewness.											
1370	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1371	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1372												
1373	<b>Chrysene</b>											
1374												
1375	<b>General Statistics</b>											
1376	Total Number of Observations				12	Number of Distinct Observations				12		
1377	Number of Detects				11	Number of Non-Detects				1		
1378	Number of Distinct Detects				11	Number of Distinct Non-Detects				1		

	A	B	C	D	E	F	G	H	I	J	K	L
1379				Minimum Detect	0.15					Minimum Non-Detect	0.37	
1380				Maximum Detect	27					Maximum Non-Detect	0.37	
1381				Variance Detects	79.11					Percent Non-Detects	8.333%	
1382				Mean Detects	5.898					SD Detects	8.895	
1383				Median Detects	1.4					CV Detects	1.508	
1384				Skewness Detects	1.878					Kurtosis Detects	2.629	
1385				Mean of Logged Detects	0.729					SD of Logged Detects	1.59	
1386												
1387	<b>Normal GOF Test on Detects Only</b>											
1388				Shapiro Wilk Test Statistic	0.68					<b>Shapiro Wilk GOF Test</b>		
1389				5% Shapiro Wilk Critical Value	0.85					Detected Data Not Normal at 5% Significance Level		
1390				Lilliefors Test Statistic	0.329					<b>Lilliefors GOF Test</b>		
1391				5% Lilliefors Critical Value	0.251					Detected Data Not Normal at 5% Significance Level		
1392	<b>Detected Data Not Normal at 5% Significance Level</b>											
1393												
1394	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1395				KM Mean	5.427					KM Standard Error of Mean	2.504	
1396				KM SD	8.269					95% KM (BCA) UCL	10.17	
1397				95% KM (t) UCL	9.923					95% KM (Percentile Bootstrap) UCL	9.583	
1398				95% KM (z) UCL	9.545					95% KM Bootstrap t UCL	20.63	
1399				90% KM Chebyshev UCL	12.94					95% KM Chebyshev UCL	16.34	
1400				97.5% KM Chebyshev UCL	21.06					99% KM Chebyshev UCL	30.34	
1401												
1402	<b>Gamma GOF Tests on Detected Observations Only</b>											
1403				A-D Test Statistic	0.522					<b>Anderson-Darling GOF Test</b>		
1404				5% A-D Critical Value	0.774					Detected data appear Gamma Distributed at 5% Significance Level		
1405				K-S Test Statistic	0.212					<b>Kolmogorov-Smirnov GOF</b>		
1406				5% K-S Critical Value	0.268					Detected data appear Gamma Distributed at 5% Significance Level		
1407	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1408												
1409	<b>Gamma Statistics on Detected Data Only</b>											
1410				k hat (MLE)	0.592					k star (bias corrected MLE)	0.491	
1411				Theta hat (MLE)	9.961					Theta star (bias corrected MLE)	12.01	
1412				nu hat (MLE)	13.03					nu star (bias corrected)	10.81	
1413				Mean (detects)	5.898							
1414												
1415	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1416	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1417	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1418	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1419	This is especially true when the sample size is small.											
1420	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1421				Minimum	0.01					Mean	5.408	
1422				Maximum	27					Median	1.35	
1423				SD	8.649					CV	1.6	
1424				k hat (MLE)	0.459					k star (bias corrected MLE)	0.4	
1425				Theta hat (MLE)	11.79					Theta star (bias corrected MLE)	13.53	
1426				nu hat (MLE)	11.01					nu star (bias corrected)	9.592	
1427				Adjusted Level of Significance ( $\beta$ )	0.029							
1428				Approximate Chi Square Value (9.59, $\alpha$ )	3.688					Adjusted Chi Square Value (9.59, $\beta$ )	3.15	
1429				95% Gamma Approximate UCL (use when $n \geq 50$ )	14.06					95% Gamma Adjusted UCL (use when $n < 50$ )	16.46	
1430												
1431	<b>Estimates of Gamma Parameters using KM Estimates</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1432					Mean (KM)	5.427					SD (KM)	8.269
1433					Variance (KM)	68.37					SE of Mean (KM)	2.504
1434					k hat (KM)	0.431					k star (KM)	0.379
1435					nu hat (KM)	10.34					nu star (KM)	9.086
1436					theta hat (KM)	12.6					theta star (KM)	14.33
1437					80% gamma percentile (KM)	8.697					90% gamma percentile (KM)	15.47
1438					95% gamma percentile (KM)	22.98					99% gamma percentile (KM)	41.96
1439												
1440	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1441	Approximate Chi Square Value (9.09, $\alpha$ )					3.379	Adjusted Chi Square Value (9.09, $\beta$ )					2.869
1442	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					14.59	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					17.19
1443												
1444	<b>Lognormal GOF Test on Detected Observations Only</b>											
1445	Shapiro Wilk Test Statistic					0.969	<b>Shapiro Wilk GOF Test</b>					
1446	5% Shapiro Wilk Critical Value					0.85	Detected Data appear Lognormal at 5% Significance Level					
1447	Lilliefors Test Statistic					0.143	<b>Lilliefors GOF Test</b>					
1448	5% Lilliefors Critical Value					0.251	Detected Data appear Lognormal at 5% Significance Level					
1449	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1450												
1451	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1452	Mean in Original Scale					5.424	Mean in Log Scale					0.536
1453	SD in Original Scale					8.639	SD in Log Scale					1.658
1454	95% t UCL (assumes normality of ROS data)					9.902	95% Percentile Bootstrap UCL					9.557
1455	95% BCA Bootstrap UCL					11.4	95% Bootstrap t UCL					20.44
1456	95% H-UCL (Log ROS)					55.79						
1457												
1458	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1459	KM Mean (logged)					0.543	KM Geo Mean					1.721
1460	KM SD (logged)					1.581	95% Critical H Value (KM-Log)					4.065
1461	KM Standard Error of Mean (logged)					0.481	95% H-UCL (KM -Log)					41.76
1462	KM SD (logged)					1.581	95% Critical H Value (KM-Log)					4.065
1463	KM Standard Error of Mean (logged)					0.481						
1464												
1465	<b>DL/2 Statistics</b>											
1466	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1467	Mean in Original Scale					5.422	Mean in Log Scale					0.528
1468	SD in Original Scale					8.64	SD in Log Scale					1.669
1469	95% t UCL (Assumes normality)					9.901	95% H-Stat UCL					57.92
1470	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1471												
1472	<b>Nonparametric Distribution Free UCL Statistics</b>											
1473	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											
1474												
1475	<b>Suggested UCL to Use</b>											
1476	95% KM Bootstrap t UCL					20.63	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					17.19
1477												
1478	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1479	Recommendations are based upon data size, data distribution, and skewness.											
1480	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1481	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1482												
1483	<b>Dibenz(a,h)anthracene</b>											
1484												

	A	B	C	D	E	F	G	H	I	J	K	L
1485	<b>General Statistics</b>											
1486	Total Number of Observations					12	Number of Distinct Observations					12
1487	Number of Detects					7	Number of Non-Detects					5
1488	Number of Distinct Detects					7	Number of Distinct Non-Detects					5
1489	Minimum Detect					0.18	Minimum Non-Detect					0.36
1490	Maximum Detect					4.1	Maximum Non-Detect					3.8
1491	Variance Detects					2.505	Percent Non-Detects					41.67%
1492	Mean Detects					1.207	SD Detects					1.583
1493	Median Detects					0.42	CV Detects					1.311
1494	Skewness Detects					1.435	Kurtosis Detects					0.563
1495	Mean of Logged Detects					-0.558	SD of Logged Detects					1.284
1496												
1497	<b>Normal GOF Test on Detects Only</b>											
1498	Shapiro Wilk Test Statistic					0.714	<b>Shapiro Wilk GOF Test</b>					
1499	5% Shapiro Wilk Critical Value					0.803	Detected Data Not Normal at 5% Significance Level					
1500	Lilliefors Test Statistic					0.38	<b>Lilliefors GOF Test</b>					
1501	5% Lilliefors Critical Value					0.304	Detected Data Not Normal at 5% Significance Level					
1502	<b>Detected Data Not Normal at 5% Significance Level</b>											
1503												
1504	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1505	KM Mean					0.82	KM Standard Error of Mean					0.391
1506	KM SD					1.233	95% KM (BCA) UCL					1.454
1507	95% KM (t) UCL					1.523	95% KM (Percentile Bootstrap) UCL					1.48
1508	95% KM (z) UCL					1.464	95% KM Bootstrap t UCL					5.698
1509	90% KM Chebyshev UCL					1.994	95% KM Chebyshev UCL					2.526
1510	97.5% KM Chebyshev UCL					3.264	99% KM Chebyshev UCL					4.714
1511												
1512	<b>Gamma GOF Tests on Detected Observations Only</b>											
1513	A-D Test Statistic					0.749	<b>Anderson-Darling GOF Test</b>					
1514	5% A-D Critical Value					0.735	Detected Data Not Gamma Distributed at 5% Significance Level					
1515	K-S Test Statistic					0.313	<b>Kolmogorov-Smirnov GOF</b>					
1516	5% K-S Critical Value					0.322	Detected data appear Gamma Distributed at 5% Significance Level					
1517	<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>											
1518												
1519	<b>Gamma Statistics on Detected Data Only</b>											
1520	k hat (MLE)					0.796	k star (bias corrected MLE)					0.55
1521	Theta hat (MLE)					1.517	Theta star (bias corrected MLE)					2.195
1522	nu hat (MLE)					11.14	nu star (bias corrected)					7.699
1523	Mean (detects)					1.207						
1524												
1525	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1526	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1527	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1528	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1529	This is especially true when the sample size is small.											
1530	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1531	Minimum					0.01	Mean					0.739
1532	Maximum					4.1	Median					0.21
1533	SD					1.306	CV					1.768
1534	k hat (MLE)					0.445	k star (bias corrected MLE)					0.389
1535	Theta hat (MLE)					1.661	Theta star (bias corrected MLE)					1.899
1536	nu hat (MLE)					10.67	nu star (bias corrected)					9.338
1537	Adjusted Level of Significance ( $\beta$ )					0.029						

	A	B	C	D	E	F	G	H	I	J	K	L
1538	Approximate Chi Square Value (9.34, $\alpha$ )					3.532	Adjusted Chi Square Value (9.34, $\beta$ )					3.008
1539	95% Gamma Approximate UCL (use when $n \geq 50$ )					1.953	95% Gamma Adjusted UCL (use when $n < 50$ )					2.293
1540												
1541	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1542	Mean (KM)					0.82	SD (KM)					1.233
1543	Variance (KM)					1.519	SE of Mean (KM)					0.391
1544	k hat (KM)					0.443	k star (KM)					0.388
1545	nu hat (KM)					10.62	nu star (KM)					9.301
1546	theta hat (KM)					1.853	theta star (KM)					2.116
1547	80% gamma percentile (KM)					1.318	90% gamma percentile (KM)					2.329
1548	95% gamma percentile (KM)					3.445	99% gamma percentile (KM)					6.259
1549												
1550	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1551	Approximate Chi Square Value (9.30, $\alpha$ )					3.51	Adjusted Chi Square Value (9.30, $\beta$ )					2.988
1552	95% Gamma Approximate KM-UCL (use when $n \geq 50$ )					2.173	95% Gamma Adjusted KM-UCL (use when $n < 50$ )					2.553
1553												
1554	<b>Lognormal GOF Test on Detected Observations Only</b>											
1555	Shapiro Wilk Test Statistic					0.84	<b>Shapiro Wilk GOF Test</b>					
1556	5% Shapiro Wilk Critical Value					0.803	Detected Data appear Lognormal at 5% Significance Level					
1557	Lilliefors Test Statistic					0.238	<b>Lilliefors GOF Test</b>					
1558	5% Lilliefors Critical Value					0.304	Detected Data appear Lognormal at 5% Significance Level					
1559	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1560												
1561	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1562	Mean in Original Scale					0.804	Mean in Log Scale					-0.93
1563	SD in Original Scale					1.271	SD in Log Scale					1.063
1564	95% t UCL (assumes normality of ROS data)					1.463	95% Percentile Bootstrap UCL					1.416
1565	95% BCA Bootstrap UCL					1.65	95% Bootstrap t UCL					6.888
1566	95% H-UCL (Log ROS)					1.833						
1567												
1568	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1569	KM Mean (logged)					-0.942	KM Geo Mean					0.39
1570	KM SD (logged)					1.056	95% Critical H Value (KM-Log)					3.017
1571	KM Standard Error of Mean (logged)					0.342	95% H-UCL (KM -Log)					1.779
1572	KM SD (logged)					1.056	95% Critical H Value (KM-Log)					3.017
1573	KM Standard Error of Mean (logged)					0.342						
1574												
1575	<b>DL/2 Statistics</b>											
1576	<b>DL/2 Normal</b>					<b>DL/2 Log-Transformed</b>						
1577	Mean in Original Scale					0.943	Mean in Log Scale					-0.768
1578	SD in Original Scale					1.295	SD in Log Scale					1.156
1579	95% t UCL (Assumes normality)					1.614	95% H-Stat UCL					2.764
1580	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1581												
1582	<b>Nonparametric Distribution Free UCL Statistics</b>											
1583	<b>Detected Data appear Approximate Gamma Distributed at 5% Significance Level</b>											
1584												
1585	<b>Suggested UCL to Use</b>											
1586	95% KM Bootstrap t UCL					5.698	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					2.553
1587												
1588	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
1589	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
1590												



	A	B	C	D	E	F	G	H	I	J	K	L
1591	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1592	Recommendations are based upon data size, data distribution, and skewness.											
1593	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1594	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1595												
1596	<b>Indeno(1,2,3-cd)pyrene</b>											
1597												
1598	<b>General Statistics</b>											
1599	Total Number of Observations				12		Number of Distinct Observations				11	
1600	Number of Detects				10		Number of Non-Detects				2	
1601	Number of Distinct Detects				9		Number of Distinct Non-Detects				2	
1602	Minimum Detect				0.23		Minimum Non-Detect				0.37	
1603	Maximum Detect				19		Maximum Non-Detect				0.39	
1604	Variance Detects				40.55		Percent Non-Detects				16.67%	
1605	Mean Detects				4.531		SD Detects				6.367	
1606	Median Detects				1.35		CV Detects				1.405	
1607	Skewness Detects				1.795		Kurtosis Detects				2.31	
1608	Mean of Logged Detects				0.676		SD of Logged Detects				1.363	
1609												
1610	<b>Normal GOF Test on Detects Only</b>											
1611	Shapiro Wilk Test Statistic				0.695		<b>Shapiro Wilk GOF Test</b>					
1612	5% Shapiro Wilk Critical Value				0.842		Detected Data Not Normal at 5% Significance Level					
1613	Lilliefors Test Statistic				0.331		<b>Lilliefors GOF Test</b>					
1614	5% Lilliefors Critical Value				0.262		Detected Data Not Normal at 5% Significance Level					
1615	<b>Detected Data Not Normal at 5% Significance Level</b>											
1616												
1617	<b>Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</b>											
1618	KM Mean				3.814		KM Standard Error of Mean				1.747	
1619	KM SD				5.743		95% KM (BCA) UCL				6.997	
1620	95% KM (t) UCL				6.952		95% KM (Percentile Bootstrap) UCL				6.773	
1621	95% KM (z) UCL				6.688		95% KM Bootstrap t UCL				14.51	
1622	90% KM Chebyshev UCL				9.056		95% KM Chebyshev UCL				11.43	
1623	97.5% KM Chebyshev UCL				14.73		99% KM Chebyshev UCL				21.2	
1624												
1625	<b>Gamma GOF Tests on Detected Observations Only</b>											
1626	A-D Test Statistic				0.672		<b>Anderson-Darling GOF Test</b>					
1627	5% A-D Critical Value				0.759		Detected data appear Gamma Distributed at 5% Significance Level					
1628	K-S Test Statistic				0.231		<b>Kolmogorov-Smirnov GOF</b>					
1629	5% K-S Critical Value				0.277		Detected data appear Gamma Distributed at 5% Significance Level					
1630	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>											
1631												
1632	<b>Gamma Statistics on Detected Data Only</b>											
1633	k hat (MLE)				0.721		k star (bias corrected MLE)				0.572	
1634	Theta hat (MLE)				6.283		Theta star (bias corrected MLE)				7.928	
1635	nu hat (MLE)				14.42		nu star (bias corrected)				11.43	
1636	Mean (detects)				4.531							
1637												
1638	<b>Gamma ROS Statistics using Imputed Non-Detects</b>											
1639	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1640	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1641	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1642	This is especially true when the sample size is small.											
1643	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											

	A	B	C	D	E	F	G	H	I	J	K	L
1644					Minimum	0.01					Mean	3.778
1645					Maximum	19					Median	1
1646					SD	6.022					CV	1.594
1647					k hat (MLE)	0.425					k star (bias corrected MLE)	0.374
1648					Theta hat (MLE)	8.886					Theta star (bias corrected MLE)	10.09
1649					nu hat (MLE)	10.2					nu star (bias corrected)	8.985
1650					Adjusted Level of Significance ( $\beta$ )	0.029						
1651					Approximate Chi Square Value (8.99, $\alpha$ )	3.318					Adjusted Chi Square Value (8.99, $\beta$ )	2.814
1652					95% Gamma Approximate UCL (use when $n \geq 50$ )	10.23					95% Gamma Adjusted UCL (use when $n < 50$ )	12.06
1653												
1654	<b>Estimates of Gamma Parameters using KM Estimates</b>											
1655					Mean (KM)	3.814					SD (KM)	5.743
1656					Variance (KM)	32.98					SE of Mean (KM)	1.747
1657					k hat (KM)	0.441					k star (KM)	0.386
1658					nu hat (KM)	10.59					nu star (KM)	9.274
1659					theta hat (KM)	8.646					theta star (KM)	9.871
1660					80% gamma percentile (KM)	6.13					90% gamma percentile (KM)	10.84
1661					95% gamma percentile (KM)	16.04					99% gamma percentile (KM)	29.16
1662												
1663	<b>Gamma Kaplan-Meier (KM) Statistics</b>											
1664					Approximate Chi Square Value (9.27, $\alpha$ )	3.493					Adjusted Chi Square Value (9.27, $\beta$ )	2.973
1665					95% Gamma Approximate KM-UCL (use when $n \geq 50$ )	10.13					95% Gamma Adjusted KM-UCL (use when $n < 50$ )	11.9
1666												
1667	<b>Lognormal GOF Test on Detected Observations Only</b>											
1668					Shapiro Wilk Test Statistic	0.938					<b>Shapiro Wilk GOF Test</b>	
1669					5% Shapiro Wilk Critical Value	0.842					Detected Data appear Lognormal at 5% Significance Level	
1670					Lilliefors Test Statistic	0.19					<b>Lilliefors GOF Test</b>	
1671					5% Lilliefors Critical Value	0.262					Detected Data appear Lognormal at 5% Significance Level	
1672	<b>Detected Data appear Lognormal at 5% Significance Level</b>											
1673												
1674	<b>Lognormal ROS Statistics Using Imputed Non-Detects</b>											
1675					Mean in Original Scale	3.805					Mean in Log Scale	0.275
1676					SD in Original Scale	6.004					SD in Log Scale	1.549
1677					95% t UCL (assumes normality of ROS data)	6.918					95% Percentile Bootstrap UCL	6.768
1678					95% BCA Bootstrap UCL	7.428					95% Bootstrap t UCL	14.53
1679					95% H-UCL (Log ROS)	28.26						
1680												
1681	<b>Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution</b>											
1682					KM Mean (logged)	0.319					KM Geo Mean	1.375
1683					KM SD (logged)	1.426					95% Critical H Value (KM-Log)	3.742
1684					KM Standard Error of Mean (logged)	0.434					95% H-UCL (KM -Log)	19
1685					KM SD (logged)	1.426					95% Critical H Value (KM-Log)	3.742
1686					KM Standard Error of Mean (logged)	0.434						
1687												
1688	<b>DL/2 Statistics</b>											
1689	<b>DL/2 Normal</b>						<b>DL/2 Log-Transformed</b>					
1690					Mean in Original Scale	3.808					Mean in Log Scale	0.287
1691					SD in Original Scale	6.002					SD in Log Scale	1.532
1692					95% t UCL (Assumes normality)	6.919					95% H-Stat UCL	26.9
1693	<b>DL/2 is not a recommended method, provided for comparisons and historical reasons</b>											
1694												
1695	<b>Nonparametric Distribution Free UCL Statistics</b>											
1696	<b>Detected Data appear Gamma Distributed at 5% Significance Level</b>											

	A	B	C	D	E	F	G	H	I	J	K	L
1697												
1698	<b>Suggested UCL to Use</b>											
1699	95% KM Bootstrap t UCL					14.51	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$ )					11.9
1700												
1701	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1702	Recommendations are based upon data size, data distribution, and skewness.											
1703	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1704	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1705												