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Mr. Jerry Wickham
Alameda County Environmental Health
1131 Harbor Parkway, Suite 250
Alameda, CA 94502-6577

December 16, 2015

RE: 2703 Martin Luther King Jr. Way, Oakland, California
PlaNet Site ID USF04645
PlaNet Project ID 27482
ACEH Case No. RO0000145

Dear Mr. Wickham:

I am informed and believe that, based on a reasonably diligent inquiry undertaken by AECOM on behalf of Equilon Enterprises LLC dba Shell Oil Products US, the information and/or recommendations contained in the attached document is true, and on that ground I declare under penalty of perjury in accordance with Water Code section 13267 that this statement is true and correct.

As always, please feel free to contact me directly at (714) 731-1050 with any questions or concerns.

Sincerely,
Shell Oil Products US

Andrea A. Wing
Principal Program Manager

AECOM
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December 16, 2015

Jerry Wickham
Alameda County Environmental Health
1131 Harbor Parkway, Suite 250
Alameda, California 94502-6577

Re: Human Health Risk Assessment
Former Shell Service Station
2703 Martin Luther King Jr. Way, Oakland, California
Shell PlaNet Site ID: USF04645 / Project ID: 27482
ACEH No. RO0000145

Dear Mr. Wickham:

On behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell), AECOM is pleased to submit this Human Health Risk Assessment for the Former Shell Service Station located at 2703 Martin Luther King Jr. Way in Oakland, California.

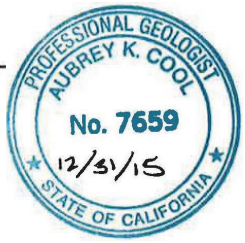
If you have any questions regarding this submission, please contact Aubrey Cool at (510) 874-1778 or Aubrey.Cool@aecom.com.

Sincerely,

AECOM

Catherine Schwach
Senior Risk Assessor

Aubrey Cool, P.G.
Project Manager



Enclosures: Human Health Risk Assessment

cc: Andrea Wing, Shell Oil Products US, electronic copy
Rodney and Janet Kwan (property owners), Auto Tech West, 2703 Martin Luther King Jr. Way, Oakland, CA 94612-1117
Monique Oatis (off-site property owner), 670 27th Street, Oakland, CA 94612

AECOM

Submitted to
Alameda County
Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Submitted by
AECOM
1333 Broadway, Ste. 800
Oakland, CA 94612
November 30, 2015

Human Health Risk Assessment

Former Shell Service Station
2703 Martin Luther King Jr. Way
Oakland, California

PlaNet Site ID	USF04645
PlaNet Project ID	27482
Agency No.	RO0000145

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List of Acronyms

ACEH	Alameda County Environmental Health
ATW	Auto Tech West
BTEX	benzene, toluene, ethylbenzene, and xylenes
COPC	chemical of potential concern
CRA	Conestoga-Rovers & Associates
CSM	conceptual site model
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EPA	Environmental Protection Agency
EPC	exposure point concentration
ESL	environmental screening level
fbg	feet below grade
HHRA	human health risk assessment
mg/kg	milligrams per kilogram
PAH	polycyclic aromatic hydrocarbon
RWQCB	San Francisco Bay Regional Water Quality Control Board
Site	former Shell service station at 2703 Martin Luther King Blvd, Oakland, CA
SPH	separate phase hydrocarbons
TPH	total petroleum hydrocarbons
TPHd	total petroleum hydrocarbons as diesel
TPHg	total petroleum hydrocarbons as gasoline
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
UCL	upper confidence limit
UST	underground storage tank
VIP	vapor intrusion pathway
VOC	volatile organic compuond

Executive Summary

A Conceptual Site Model (CSM) and screening level Human Health Risk Assessment (HHRA) were developed for the former Shell service station located at 2703 Martin Luther King Jr. Way, Oakland, California ("the Site"). Complete exposure pathways include:

- Hypothetical future on-site resident: inhalation of soil particles in outdoor air, inhalation of volatile organic chemicals (VOCs) in indoor air from soil vapor, and direct contact or incidental ingestion of soil,
- Current and future off-site residents: inhalation of VOCs in indoor air from soil vapor migrating off site,
- Current and future commercial/industrial worker: incidental ingestion and direct contact with soil if asphalt is removed or not maintained, and inhalation of VOCs in indoor air from soil vapor, and
- Future construction/excavation worker: inhalation of soil particles in outdoor air, and direct contact or incidental ingestion of soil.

Inhalation of soil particles, direct contact, and incidental ingestion of soil did not indicate an unacceptable risk from site-related chemicals for any of the receptors.

Due to the complications of estimating soil vapor concentrations from groundwater concentrations, more weight was placed on soil vapor results for the interpretation of potential risks due to vapor intrusion. There were minor exceedances for the off-site resident for total petroleum hydrocarbons as gasoline (TPHg) only based on soil vapor samples. Additional soil gas sampling is recommended at VP-7 and VP-13 to give further understanding of the potential for vapor intrusion.

Benzene, ethylbenzene and TPHg may present a potential risk for vapor intrusion to future commercial/industrial workers. Qualitative review of older data indicated that there are no risks expected from vapor intrusion to current commercial/industrial worker at the existing on-site building.

AECOM recommends preparing a revised corrective action plan in alignment with *Low-Threat Underground Storage Tank Case Closure Policy* criteria.

1 Introduction

AECOM is pleased to present this screening level Human Health Risk Assessment (HHRA) for the former Shell service station ("the Site") located at 2703 Martin Luther King Jr. Way, Oakland, California (Figure 1). Currently the Site is occupied by Auto Tech West (ATW) and is used as an automotive repair shop.

2 Background

This section describes the Site and associated environmental history, geology, and hydrogeology.

2.1 Site Description

The Site is a former service station located on the northwest corner of Martin Luther King Jr. Way and 27th Street in a commercial and residential area of Oakland, California (Figure 1). A Shell service station operated on the property from approximately 1959 to 1979, with two dispenser islands, three gasoline underground storage tanks (USTs), and a waste oil UST. The fueling equipment was removed after Shell terminated operations at the Site. In 1979, Acme West Ambulance Company purchased the Site and installed a 2,000-gallon gasoline UST in the same approximate location of Shell's former USTs. The property was sold to ATW in 1986, and the Site is currently used as an automotive repair shop. ATW reportedly never used the UST that was removed in 1994, although an active 150-gallon aboveground waste oil tank is currently in use in the northern-central portion of the property. Gasoline constituents were detected in soil samples collected following the removal of a 2,000-gallon UST and separate-phase hydrocarbons (SPH) were detected at several soil boring locations during October 1994. Two excavations occurred at the Site (as seen in Figure 2). The UST pit was over-excavated from 9 feet below grade (fbg) to approximately 11 fbg during 1996 prior to backfilling with clean, imported fill material. A shallow soil (0-2 fbg) excavation was completed in 2013 behind the former service station building. An area on the northwestern boundary of the property (around soil sample W-2, Figure 2) was over-excavated to 3 fbg. The Site currently has one existing building in the northwest corner of the property with open bays. The remaining portion of the Site completely paved with asphalt.

2.2 Environmental Site History

Environmental activities have been performed at the Site since 1994. A detailed description is provided in Appendix A and all sample locations are provided on Figures 2 and 3.

2.3 Regional Geology and Hydrogeology

The Site is within the East Bay Plain basin. Existing beneficial uses of the East Bay Plain basin include municipal and domestic water supply, industrial service supply, industrial process supply, and agricultural water supply. The Site falls within Zone A of the East Bay Plain basin, as defined in the June 1999 "East Bay Plain Groundwater Basin Beneficial Use Evaluation Report for Alameda and Contra Costa Counties, CA" (San Francisco Bay Regional Water Quality Control Board [RWQCB]). Groundwater in Zone A is noted as an existing or probably drinking water resource, with a deep basin ranging from 500 to over 1,000 feet. However, the document also states that the City of Oakland has no plans to "develop local groundwater resources for drinking water purposes because of existing or potential salt water intrusion, contamination, or poor or limited quantity."

2.4 Site Specific Geology and Hydrogeology

The Site is generally underlain by fine-grained soils (clays and silts). A coarser-grained lens may be present at approximately 10 to 25 fbg. The coarser-grained lens does not appear to extend beneath the Site to the southeast, nor to the southwest, and appears to thin northwest of the Site. Additional non-continuous coarser-grained lenses are shown on cross sections for the Site (Conestoga-Rovers & Associates [CRA], 2008).

Depth to groundwater in site monitoring wells has ranged historically from approximately 3 to 10 fbg. Groundwater has also been encountered in shallow soil vapor probe screen intervals at the Site even when no groundwater is encountered in deeper screen intervals in the same locations (i.e., VP-3 during May 2007), and when groundwater in the nearby monitoring wells is deeper. This may be indicative of perched water along preferential pathways. The sanitary and storm sewer systems in the vicinity, buried at depths ranging from 3.5 to 9 fbg, may encounter groundwater. Additional utility lines were identified in the northwest corner of the property, including a potential sewer line deeper than 4 fbg, an electrical line traced from the station building to the western property boundary, and an unidentified utility traced from the northwest corner of the building to the southwest. Groundwater has been first encountered during drilling at depths ranging from approximately 7 to 15 fbg. Based on this, groundwater may be semi-confined at the Site. Groundwater flow direction varies from west-northwest to southwest at a gradient ranged from "variable" to 0.01 to -0.07 feet per foot (Groundwater

Monitoring Reports 2008 through 2015). Department of Water Resources (DWR) records during 2003 and a door-to-door survey of properties within 500 feet of the Site in 2003 and 300 feet in 2006 did not identify a well within a one-half mile radius of the Site. The nearest surface water body is Lake Merritt, which is over one-half mile southeast of the Site. Based on the absence of drinking water wells within one-half mile radius of the Site and the City of Oakland having no plans to develop local groundwater resources, groundwater at the Site is not considered to be a drinking water source.

3 Human Health Risk Assessment

A HHRA was prepared to estimate human health risks to current and future on-site commercial/industrial workers, hypothetical future residents, hypothetical construction/excavation workers, and current off-site residents from total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), lead, fuel oxygenates, and volatile organic compounds (VOCs) detected in soil, groundwater, and soil vapor samples collected on and off the Site. The HHRA was performed in accordance with the RWQCB (2013) Environmental Screening Level (ESL) guidance for evaluating sites contaminated by releases of hazardous chemicals and with United States Environmental Protection Agency (EPA) guidance for evaluating human health risks assessments (EPA, 2004; 2009; 2015a-c).

This HHRA is presented in five parts:

- Hazard Identification,
- Exposure Assessment,
- Toxicity Assessment,
- Risk Characterization,
- Uncertainty Assessment; this section includes a qualitative discussion of the impacts of uncertainties in the risk assessment process on the final results.

The following text in this section describes details of the risk assessment process, assumptions made, and the HHRA results. The conclusions of this HHRA are provided in Section 5.

3.1 Hazard Identification

This section describes the selection of Chemicals of Potential Concern (COPCs) for the receptors included in this HHRA and the data evaluation procedures used as the basis to characterize the COPC source term concentrations in soil, groundwater, and soil vapor. "Source term" refers to a representative concentration of a chemical at its source. This HHRA assumes the data collected on- and off- site from soil from 0 to 10 fbg, groundwater collected from the last five semi-annual groundwater monitoring events (the last two years), and soil vapor samples 3 to 5 feet fbg from 2015 soil vapor probes VP-3, -12, -13 and -14 are representative of source concentrations. A Conceptual Site Model (CSM) illustrating potential pathways between the COPC sources and human receptors is also presented in this section.

3.1.1 Data Evaluation

The HHRA was performed using soil, groundwater, and soil vapor data (Appendix B). The soil data were segregated into two exposure depths to accommodate the needs of the HHRA:

- 0 to 3 fbg for the minimal disturbance of exposure to surface soils and
- 0 to 10 fbg data set for the intrusive exposure scenario (RWQCB, 2013).

For each medium, data from both on-site and off-site locations were initially combined into a single dataset. Soil samples that were determined to be excavated were removed. Method reporting limits were used to represent non-detect concentrations. If a chemical was never detected in any sample for a particular media, the chemical data were evaluated for the adequacy of reporting limits and is presented in the uncertainty section. The most recent ProUCL software program is version 5.0.00 (2013) and was used to calculate the summary statistics by the Kaplan-Meier method (Appendix C). No duplicate data were identified.

3.1.1.1 Soil Data

Soil samples were collected throughout the Site and in surrounding off-site properties from 1995 to 2015. A total of 183 samples from 109 boring locations were used (Appendix B). Samples that were collected deeper than 10 fbg and samples that were excavated were not included. Excavated samples were determined based on the description of the 1996 excavation and the 2013 excavation report (see Figure 2). Soil data used in this risk assessment are presented in Appendix B-1.

3.1.1.2 Groundwater Data

Thirteen (13) groundwater monitoring locations from the last two years of groundwater monitoring events were used to represent current groundwater conditions. Groundwater collected prior to 2013 was deemed to be outdated and not representative of current site conditions. These data were collected from November 2013 through August 2015 (see Figure 3 for sample locations). Groundwater data used in this risk assessment are presented in Appendix B-2.

3.1.1.3 Soil Vapor Data

Fifteen (15) soil vapor samples from four locations were collected in 2015 at 3 and 5 fbg and used in this evaluation. Soil vapor data from previous sampling events, ranging from 2007 to 2010, were deemed outdated and not representative of current site conditions (see Figure 3). Soil vapor data used in this risk assessment are presented in Appendix B-3.

3.1.2 Chemicals of Potential Concern

The identification of COPCs is based on the current site characterization data described in previous reports (Section 2.0 and Appendix A). Soil was analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX), oxygenates, PAHs, TPHs, and lead. Groundwater was analyzed for BTEX, oxygenates, and TPH gasoline (TPHg). Soil vapor was analyzed for BTEX, naphthalene, and TPHg. Statistical summaries for all media are presented in Tables 1 through 4. Only analytes with at least one detection were carried into the screening level risk assessment.

3.1.2.1 Exposure Point Concentrations

Exposure is the co-occurrence in location and time of a receptor and a chemical agent. The exposure point concentration (EPC) is the concentration of the agent at the exposure point (location of contact) to which a receptor potentially could be exposed and should be representative of the exposure area being evaluated. Maximum detected concentrations of COPCs were used as initial EPCs and were presented on Tables 1 through 4. If the maximum detected concentration exceeded the selected screening level, and in accordance with EPA guidance regarding statistical methodology to be used in EPC estimation (EPA, 2002), the lower of the maximum or 95% upper confidence limit (UCL) of the mean of values in a medium (e.g., soil) can be used as the EPC representing a reasonable maximum exposure.

3.1.3 Conceptual Site Model

The receptor scenarios addressed in this HHRA are current and/or future commercial/industrial workers, construction/excavation workers, and off-site residents. The CSM diagram (Figure 4) illustrates the COPC source, release mechanisms, transport pathways, exposure media, and receptors considered in this HHRA. It is important to note that not all pathways are likely to lead to significant exposures. The significance of each exposure route and pathway is indicated for each potential receptor in the CSM diagram. Only the pathways considered to result in potentially significant exposure are evaluated in this HHRA. A summary of these pathways is presented:

- Hypothetical Future On-Site Resident – This scenario is used as a surrogate to characterize the potential for unrestricted use of the area. Inhalation of soil particles in outdoor air, inhalation of VOCs in indoor air from soil vapor, and direct contact or incidental ingestion of soil (0-3 fbg) were evaluated as a complete exposure pathway.
- Current and Future Off-Site Resident – Residential buildings exist along the western and northern property boundary. Residents may be exposed to soil vapor migrating off site. Outdoor air was considered not to result in significant exposures to these receptors, and so only the hypothetical vapor intrusion pathway (VIP) was evaluated.
- Current and Future Commercial/Industrial Worker – Commercial/industrial workers are present at the Site under current and future land use conditions. The site currently is completely paved with asphalt, and will likely continue to be covered in the future, but there is potential that the asphalt would be removed and expose the commercial/industrial worker to soil (0-3 fbg). Therefore, incidental ingestion and direct contact with soil is potentially complete for future commercial/industrial worker. It is also possible that if the asphalt is not maintained in good condition, VOCs may volatilize into outdoor air.

Due to the mixing with ambient air, that pathway is not considered to result in significant exposure. Inhalation of subsurface VOCs in indoor air from soil vapor was evaluated for this exposure pathway.

- Future Construction/Excavation Worker – Currently there are no plans for construction or re-development of the Site. However, construction/excavation workers may be present in the future. Inhalation of soil particles in outdoor air, direct contact or incidental ingestion of soil (0-10 fbg) were evaluated as a complete exposure pathway. Inhalation of subsurface VOCs in outdoor air was considered not to result in significant exposures to these receptors.

3.2 Exposure Assessment

The objectives of the exposure assessment are to characterize the intensity, frequency, magnitude, and duration of potential human exposures for the subject COPCs and receptor scenarios. The end product of this process is an estimate of chemical exposure that integrates the activity patterns for the receptors (e.g., contact rates, exposure frequency, and duration) with source term concentrations for the media of concern. The remainder of this section describes the basic steps used to quantitatively evaluate exposure for each COPC and receptor.

3.2.1 COPC Sources, Transfers, and Exposure Concentrations

COPCs initially released from a primary source (e.g., USTs) into soil may be redistributed among physical phases and/or environmental media and migrate as liquids and vapors, eventually accumulating in "secondary source" media (e.g., groundwater or soil vapor). The CSM diagram (Figure 4) presents the flow of chemical sources, release mechanisms, and the vapor intrusion exposure pathway relevant to this HHRA. To quantitatively evaluate potential COPC exposures for the evaluated receptors, maximum detected concentrations of detected analytes were compared to relevant ESLs. This offers a health-protective assessment of potential health risks because of the use of maximum detected concentrations and the fact that ESLs were developed as health-protective screening levels (RWQCB, 2013).

If VOCs are present in soil, soil gas, or groundwater, there is the potential for these chemicals to volatilize into indoor air. The RWQCB recommends the collection of subsurface groundwater and soil vapor data prior to the collection of indoor air samples to evaluate the VIP (RWQCB, 2013). Due to the large uncertainties associated with measuring concentrations of volatile contaminants during soil sampling, as well as the uncertainties associated with soil partitioning calculations, soil samples are considered a secondary source to evaluate vapor inhalation (Department of Toxic Substances Control [DTSC], 2011 and RWQCB, 2013). Therefore, soil data for VOCs were not used for quantitative evaluation of the VIP, which is also in keeping with EPA guidance (EPA, 2004).

3.2.2 Selected Environmental Screening Levels

All screening levels were selected from the most current ESLs (RWQCB, 2013). The selected ESLs are shown in Tables 5 through 7. Soil screening levels presented in Table 5 were selected from Tables K-1, K-2, and K-3 of the ESLs (RWQCB, 2013). These tables present direct exposure ESLs for residents, commercial/industrial workers, and construction workers, respectively. Groundwater screening levels presented in Table 6 were selected from Table E-1 of the ESLs (RWQCB, 2013). This table presents groundwater screening levels for evaluation of potential soil vapor intrusion in both residential and commercial/industrial land use. Soil vapor screening levels presented in Table 7 were selected from Table E-2 of the ESLs (RWQCB, 2013). This table presents soil vapor screening levels for evaluation of potential soil vapor intrusion in both residential and commercial/industrial land use. ESLs are relevant in that they consider the same potential exposure routes as were identified in the CSM. ESLs are based on the lowest of either the cancer or non-cancer endpoints, and the cancer-based ESLs represent a 1E-06 target risk and the non-cancer ESLs represent the concentration at which no adverse health effects are anticipated.

3.3 Screening Evaluation

A screening level evaluation identifies those chemicals that are most likely to drive the potential risk for each receptor at the Site. It does this by using the maximum detected COPC concentrations and screening-level risk-based concentrations (i.e. ESLs) that use upper-bound exposure and toxicity values. This section describes the results of the screening-level evaluation conducted for the HHRA.

3.3.1 Soil Screening Evaluation

The maximum detected concentration of each analyte was screened against the selected screening level for two different soil depths (Tables 8 through 10) for the resident and construction/excavation worker. Data sensitivity for analytes that were non-detect are presented in the uncertainty section. For each maximum concentration that exceeded the screening level, maximum concentration sample location, sample depth, and magnitude of the exceedance were noted. The 0 to 3 fbg interval was used for the on/off-site resident and the commercial/industrial worker receptors. The 0 to 10 fbg interval was used for the future construction/excavation worker receptor.

3.3.1.1 Resident

Five analytes exceeded their respective residential ESLs: benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-c,d)pyrene, TPH diesel (TPHd), and lead (Table 8).

Of 40 samples, there were 13 exceedances of benzo(a)pyrene residential ESL of 0.038 milligrams per kilogram (mg/kg) in two on-site locations and six off-site locations (Table 8). The on-site magnitudes[1] of exceedance were low, at factors of two and three. The off-site magnitude of exceedance ranged from factors of one to 45. The maximum concentration of benzo(a)pyrene was detected at HA-10 at 0 fbg at a concentration of 1.7 mg/kg (Table 8).

There was one exceedance for benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene at off-site location, HA-10 (0 fbg) (Table 8). The maximum concentrations of benzo(b)fluoranthene and indeno(1,2,3-c,d)pyrene were 2.0 and 1.7 mg/kg, respectively. The magnitude of exceedances for were a factor of five and four, respectively.

TPHd exceeded its ESL in one of 41 samples at HA-10 (1 fbg). TPHd was detected at 430 mg/kg, slightly exceeding its resident ESL of 240 by a factor of two (Table 8).

Thirty-one (31) of 45 samples exceeded the ESL for lead at 23 locations (nine on site and 14 off site) (Table 8). The magnitude of on-site exceedances ranged from factors of one to 14 while off-site magnitude of exceedances ranged from factors of one to 125. The maximum concentration of lead was detected at off-site location HA-19 at 0 fbg at a concentration of 10,000 mg/kg.

3.3.1.2 Commercial/Industrial Worker

Three analytes exceeded their respective commercial ESLs: benzo(a)pyrene, benzo(b)fluoranthene, and lead (Table 9). Indeno(1,2,3-c,d)pyrene was detected at a maximum concentration of 1.7 mg/kg, and the magnitude of exceedance, one, was considered equivalent to the commercial screening level and, therefore, not considered an exceedance.

Of 40 samples, there were eight exceedances of benzo(a)pyrene in six off-site locations (Table 9). The range of magnitude of exceedance were factors one to 13. The maximum concentration of benzo(a)pyrene was detected at HA-10 at 1 fbg at a concentration of 1.7 mg/kg.

Benzo(b)fluoranthene exceeded its respective commercial ESL in one of 40 samples, at off-site location HA-10 (0 fbg) (Table 9). The maximum concentration of benzo(b)fluoranthene was 2.0 mg/kg, slightly exceeding the ESL of 1.3 m/kg by a factor of two.

Twenty (20) out of 45 samples exceeded the lead ESL in three on-site locations and 13 off-site locations (Table 9). The magnitude of exceedances for on-site locations ranged from factors of one to three. The magnitude of the maximum exceedance for off-site locations ranged from factors of one to 31. The maximum concentration of lead was detected at HA-19 at 0 fbg at a concentration of 10,000 mg/kg.

3.3.1.3 Construction/Excavation Worker

Three analytes exceeded their respective construction ESLs: benzo(a)pyrene, TPHg, and lead (Table 10). Benzene was detected at a maximum concentration of 72 mg/kg, which was considered equivalent to the construction screening level of 71 mg/kg and, therefore, was not considered an exceedance.

[1] Magnitude is calculated by dividing the detected concentration by the screening level.

One of 58 samples exceeded the screening level for benzo(a)pyrene (0.83 mg/kg) (Table 10). The concentration of benzo(a)pyrene was approximately twice its ESL. The maximum detected concentration of benzo(a)pyrene was detected at HA-10 at 1 fbg at a concentration of 1.7 mg/kg.

Six out of 118 samples exceeded the TPHg screening level at four on-site locations. The magnitude of the TPHg exceedance ranged from factors of one to six. The maximum concentration of TPHg was detected at B-42 at 10 fbg at a concentration of 17,000 mg/kg (Table 10).

Twenty-one (21) of 69 samples exceeded the lead ESL at 16 locations (three on --site and 13 off site). The magnitude of exceedances ranged from factors of one to 31. The maximum concentration of lead was detected at HA-19 at 0 fbg at a concentration of 10,000 mg/kg (Table 10).

3.3.2 Groundwater Screening Evaluation

The maximum reported concentration of each analyte was screened against the selected screening level (Table 11 and 12) for each receptor. Data sensitivity for analytes that were non-detect are presented in the uncertainty section. For each maximum concentration that exceeded the screening level, the sample location, and the magnitude of the exceedance were noted.

3.3.2.1 Resident

Two analytes exceeded their respective residential ESLs: benzene and ethylbenzene (Table 11).

Of 43 samples, there were 29 exceedances of benzene in eight locations (six on site and two off site). The magnitude of exceedances for on-site locations ranged from factors of three to 230. The magnitude of exceedances for off-site locations ranged from factors of 12 to 59. The maximum concentration of benzene was detected at MW-5 (on site) at a concentration of 6,200 micrograms per liter (µg/L), exceeding the resident ESL of 27 µg/L (Table 11).

Eleven (11) of 43 samples exceeded the ethylbenzene ESL in three locations(two on site and one off site) (Table 11). The magnitude of exceedances for on-site locations ranged from factors of 13 to 19. The magnitude of exceedances for off-site locations ranged from factors of two to nine. The maximum concentration of ethylbenzene was detected at MW-5 (on site) at a concentration of 5,900 µg/L, exceeding the resident ESL of 310 µg/L.

3.3.2.2 Commercial/Industrial Worker

Two analytes exceeded their respective commercial ESLs: benzene and ethylbenzene (Table 12).

Twenty-two (22) of 43 samples exceeded the benzene ESL in seven locations (five on site and two off site). The magnitude of exceedances for on-site locations ranged from factors one to 23. The magnitude of exceedances for off-site locations ranged from factors one to six. The maximum concentration of benzene was detected at MW-5 (on site) at a concentration of 6,200 µg/L, exceeding the commercial ESL of 270 µg/L (Table 12).

Of 43 samples, there were seven exceedances of ethylbenzene in two on-site locations (Table 12). The magnitude of exceedances ranged from factors of one to two. The maximum concentration of ethylbenzene was detected at MW-5 at a concentration of 5,900 µg/L, exceeding the commercial ESL of 3,100 µg/L.

3.3.3 Soil Vapor Screening Evaluation

The maximum reported concentration of each analyte was screened against the selected screening level (Tables 13 and 14) for each receptor. Data sensitivity for analytes that were non-detect are presented in the uncertainty section. For each maximum concentration that exceeded the screening level, sample location, sample depth, and magnitude of the exceedance were noted.

3.3.3.1 Resident

Three analytes exceeded their respective residential ESLs: benzene, ethylbenzene, and TPHg (Table 13).

Six of 15 samples exceeded the benzene ESL at three locations (two on site and one off site). The magnitude of exceedances for on site ranged from factors of one to approximately 16,000. The magnitude of exceedance for the one off-site location was a factor of 18. The maximum concentration of benzene was detected at VP-14 at a concentration of 690,000 micrograms per cubic meter (µg/m^3), exceeding the residential ESL of 42 µg/m^3 (Table 13).

Of 15 samples, there were two exceedances of ethylbenzene in one on-site location, VP-14 (Table 13). The magnitude of the exceedance was by factors of 98 and 192. Ethylbenzene was detected at a maximum concentration of 94,000 µg/m^3, exceeding the residential ESL of 490 µg/m^3.

Eight of 15 samples exceeded the TPHg ESL at three locations (two on site and one off site) (Table 13). The magnitude of exceedances for on site ranged from factors of 833 to approximately 2,700. The magnitude of exceedance for the one off-site location ranged from factors of one to two. The maximum concentration of TPHg was detected at VP-3 (on site) at a concentration of 800,000,000 µg/m^3, exceeding the resident ESL of 300,000 µg/m^3.

3.3.3.2 Commercial/Industrial Worker

Three analytes exceeded their respective commercial ESLs: benzene, ethylbenzene, and TPHg (Table 14).

Five of 15 samples exceeded the benzene ESL at two locations (one on site, one off site). The magnitude of exceedances for on site ranged from factors of 452 to approximately 1,600. The magnitude of exceedance for the one off-site location was by a factor of two. The maximum concentration of benzene was detected at VP-14 at a concentration of 690,000 µg/m^3, exceeding the resident ESL of 420 µg/m^3 (Table 14).

Of 15 samples, there were two exceedances of ethylbenzene in one location, VP-14 (Table 14). The magnitude of the exceedances were factors of 10 and 19. Ethylbenzene was detected at a maximum concentration of 94,000 µg/m^3, exceeding the resident ESL of 4,900 µg/m^3.

Six of 15 samples exceeded the TPHg ESL at two on-site locations (Table 14). The magnitude of exceedances for on site ranged from factors of 100 to 320. The maximum concentration of TPHg was detected at VP-3 at a concentration of 800,000,000 µg/m^3, exceeding the commercial ESL of 2,500,000 µg/m^3.

3.4 Toxicity Characterization

The toxicity assessment in a health risk evaluation characterizes the relationship between the magnitude of exposure to a COPC and the nature and magnitude of adverse health effects that may result from such exposure (i.e., dose-response relationships), and these relationships are embodied in toxicity values slope factors, references doses, etc. The ESLs are based on the toxicity values shown in Table J-2 of the ESL guidance document (RWQCB, 2013). ESL exposure parameters and calculations are shown in the ESL guidance document (RWQCB, 2013). ESLs calculated for residential land uses are based on both child and adult exposure. ESLs for commercial/industrial/ and construction/excavation uses are based solely on exposures to adults.

3.5 Risk Characterization

The risk characterization process integrates the quantitative and qualitative results of the data evaluation, exposure, and toxicity assessments. The purpose of risk characterization is to estimate the likelihood, incidence, and magnitude of the potential human health effects from exposure to the COPCs under study and make judgments about the nature of the health threat to the defined receptor populations. The evaluation of potential risk described below focuses only on the chemicals whose maximum concentrations exceeded their respective risk-based screening levels. This is considered health-protective because of the conservative nature of the screening described above which used health-protective exposure assumptions and the maximum concentration of each chemical detected at the Site. While this approach will not estimate potential health risks, it will focus the assessment to the areas and chemicals that drive the potential risks.

3.5.1 Soil

Six analytes (benzo(a)pyrene, benzo(b)fluoranthene, indeno (1,2,3-c,d)pyrene, TPHd, TPHg, and lead) exceeded the screening level for at least one receptor. These chemicals are discussed for each potential exposure scenario below.

3.5.1.1 Resident

Hypothetical future on-site resident scenario was used as a surrogate to characterize the potential for unrestricted use of the area. The maximum detected concentrations of on-site soils exceed the screening level for benzo(a)pyrene and lead (Table 8).

The on-site detection frequency for benzo(a)pyrene was low (11%) with relatively low magnitude of exceedance (three times the screening level). The detected results were an estimated value and below method reporting limit. The 95% UCL for benzo(a)pyrene in on-site soils at the 0-3 fbg interval was calculated to be 0.0591 mg/kg (Table 1) and would exceed the screening level by a factor of two.

Lead exceeded the screening level in 11 out of 23 on-site samples with moderate exceedances (Table 8). The June 2013 Subsurface Investigation Report states "lead in shallow soils is a regional issue not associated with the former station operations. The distribution of lead in shallow soils may be part of a regional impact associated with the Site's proximity to the Interstate 980 Freeway (built in the 1960s), which operated for many years before leaded gasoline was eliminated in 1986 or due to chipping and peeling of lead-based paint from old buildings in the area. Recent studies have shown that lead concentrations in urban soils can range from 100 mg/kg to 3,000 mg/kg in neighborhoods adjacent to highly traveled roadways or next to older paned buildings. The source of lead concentrations higher than 3,000 mg/hg is unknown, but based on their distribution they do not appear to be related to the former station operations." HA-19 (located off site) was the location with the highest lead concentration (10,000 mg/kg) but it was not in close proximity to the former waste oil above-ground storage tank, which was located behind the former Shell service station building and gives further support that lead results are not likely due to site activities.

Because it is unlikely that the current land uses will change in the near future, the frequency and magnitude of the exceedance for PAHs were low, and it is unlikely that the lead results are related to site activities, there are probably no unacceptable risks from site-related chemicals in soil for hypothetical future on-site residents.

The current and future off-site resident scenario indicated that benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-c,d)pyrene, TPHd, and lead maximum detected concentration exceeded the selected screening level (Table 8). All three PAHs had moderate off-site detection frequencies (e.g., 43% to 57%). HA-10 (at 0 fbg) is the maximum location for all three PAHs. Benzo(b)fluoranthene and indeno (1,2,3-c,d)pyrene only exceeded the screening level at HA-10. The next highest exceedance of benzo(a)pyrene was at HA-12 (0 fbg) with a concentration of 0.26 mg/kg, which is seven times higher than the screening level. A 95% UCL was calculated to be 0.349, 0.841, and 0.345 mg/kg for benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene, respectively (Table 1). Benzo(a)pyrene and benzo(b)fluoranthene continued to exceed their respective screening levels by factors of nine and two, respectively.

As noted in the June 2013 Subsurface Investigation Report, Shell reviewed the PAH chromatogram for surface soil sample HA-10 and concluded that the PAHs are from a pyrogenic source, which is consistent with urban soils, soot, storm water runoff, etc. and have no connection to waste oil. This is indicated by the dominance of non-substituted PAHs (i.e., EPA Method 8270C target PAH compounds) as opposed to substituted derivatives of these parent chemicals. In petrogenic materials including used oil, the relative abundance of unsubstituted PAHs is relatively small and buried within the oil "hum" or unresolved complex material. The chromatograms and Shell's analysis of the PAH data were included in Appendix C and D of CRA's Subsurface Investigation Report (2013). In a letter dated October 30, 2013, Alameda County Environmental Health (ACEH) acknowledged that lead and PAHs detected on adjacent properties are likely not related to the former service station's operations.

TPHd had a relatively high off-site detection frequency (82%) but only one minor exceedance, which was only two times the screening level. A 95% UCL was calculated for TPHd (113.3 mg/kg, Table 1), which was below the screening level (240 mg/kg).

Because 1) the frequency and magnitude of exceedance for PAHs were relatively low (except for HA-10), 2) the likelihood that the PAH and lead results are not related to site activities, and 3) the lack of exceedances when a more reasonable representation of an EPC was used; there are probably no unacceptable risks from site-related chemicals in soil to current and future off-site residents.

3.5.1.2 Commercial/Industrial Worker

The maximum detected concentrations of benzo(a)pyrene, benzo(b)fluoranthene, and lead exceeded their respective selected screening levels for the current and future commercial exposure scenario (Table 9). Lead was the only soil analyte located on site that exceeded the selected screening level. Soil samples associated with on-site soil PAHs were below screening levels. Lead exceeded the commercial screening level at both on and off-site locations. On-site lead exceeded the screening level four times (out of 23 samples) with a low magnitude of exceedance (Table 9). As stated in Section 3.5.1.1, elevated lead concentrations are not likely to be associated with site activities. In addition, the Site is currently 100% covered with either buildings or asphalt and there are no plans for changes to the Site. Therefore, exposure to site soil is not expected to occur now or in the foreseeable future.

Due to the fact that 1) commercial workers will only have contact with on-site soils, 2) the low magnitude of the on-site exceedance for lead, 3) lead results are not related to site activities, and 4) the Site is completely paved, there are no unacceptable risks related to soil for current and future on-site commercial/industrial workers.

3.5.1.3 Construction/Excavation Worker

The maximum detected concentrations of benzo(a)pyrene, TPHg, and lead exceeded their respective screening levels for the current and future construction scenario (Table 10). Benzo(a)pyrene exceeded the screening level one time with a low magnitude of exceedance at location HA-10 (0 fbg) (Table 10). As stated in section 3.5.1.1, PAHs, and in particular PAHs at HA-10, are not related to site activities, but rather likely are associated with pyrogenic sources. A 95% UCL for benzo(a)pyrene was calculated (0.134 mg/kg, Table 2) and was well below the screening level (0.83 mg/kg). TPHg exceeded the screening level six times (out of 118 samples) with a low magnitude of exceedance (Table 10). A 95% UCL was calculated for TPHg (914.1 mg/kg, Table 2), which was below the screening level (2,700 mg/kg). Lead exceeded the selected screening level 21 times with a relatively high factor of exceedance (31). As stated in Section 3.5.1.1, lead is not associated with site activities and likely represents a regional issue.

Due to the fact that 1) 95% UCL is a more reasonable representation of an EPC, 2) benzo(a)pyrene and TPHg 95% UCLs did not exceed their respective screening levels, and 3) lead results are likely related to a larger regional issue, results indicates that there are probably no unacceptable risks from site-related chemicals in soil for current and future construction/excavation workers.

3.5.2 Groundwater and Soil Vapor

Due to the complex nature of vapor intrusion, multiple lines of evidence were used to evaluate vapor intrusion exposure. Ideally, if the media are in equilibrium, the associated vapor intrusion risk should be approximately the same. However, many physical and chemical factors unique to each site may combine to make reliance on groundwater data alone or on soil vapor data alone problematic. Therefore, while the DDTSC vapor intrusion guidance (DTSC 2011) expresses a preference for soil vapor data over groundwater data, a combination of the two will be used to help interpret the potential for vapor intrusion at this site.

3.5.2.1 Resident

The hypothetical future on-site resident scenario was used as a surrogate to characterize the potential for unrestricted use of the Site and immediate vicinity. As discussed in section 3.3.2.1, the maximum detected concentrations of benzene and ethylbenzene in on-site groundwater exceed their respective residential screening level (Table 11), while the maximum detected concentrations of benzene, ethylbenzene, and TPHg in on-site soil vapor exceeded their respective screening levels (Table 13). Due to the fact the there are no plans to change the current land use of the Site and that residential use on site is unrealistic, the on-site scenarios evaluated in Tables 11 13 are not relevant or discussed further. The remaining portion of this Section will focus solely on off-site vapor intrusion for the current and future off-site scenario. It is important to note that on-site shallow surface soil vapor closest to the property line (VP-3 at 3 fbg, Figure 3) was below or essentially equal to the screening levels for benzene, ethylbenzene, and TPHg.

Soil vapor at VP-13 was 18 times higher than the benzene soil vapor screening level in April but when it was sampled again in August it was non-detect and well below the screening level (Table 15). VP-13 was sampled for two times, once in the spring and once in summer, with two substantially different results. This difference may be due to seasonality and or the quality of the soil vapor sample collected in April. The laboratory diluted the April sampling event prior to analysis and the August sampling event was not diluted. Groundwater in the vicinity of VP-13 was reviewed to further elaborate on the potential for vapor intrusion. VP-13 is roughly between MW-14 and MW-13 and both groundwater locations moderately exceeded the groundwater vapor intrusion screening level (Table 11). It is important to note that soil vapor at VP-12, which is within seven feet of MW-13 and collected around the same time, was non-detect and well below the soil vapor screening level for benzene (Table 15). Due to the one exceedance in April and the potential of groundwater in the vicinity of VP-13 to exceed the groundwater vapor intrusion screening level, additional soil gas sampling is recommended for VP-13.

Ethylbenzene was never detected in soil vapor samples while groundwater slightly exceeded the screening level at one location (MW-14) (Tables 11 and 13). This suggests that the ethylbenzene in the nearby groundwater was not entering the vapor phase in the soil gas at levels of concern.

TPHg in soil gas at VP-13 (at 3 fbg) slightly exceeded the screening level (Table 13).

Soil vapor results indicate that benzene and ethylbenzene likely do not pose an unacceptable risk for the off-site resident (Table 15), but verification at VP-13 is warranted. TPHg in soil gas slightly exceeded the screening level only at VP-13 at 3 fbg. Magnitudes of screening level exceedances were relatively minor; one and two for the April and August sampling events, respectively (Table 15). It is noted that, shallow results (3 fbg) for TPHg were nearly an order of magnitude greater than the deeper 5 fbg results (Table 15). Additional testing is necessary to verify these results.

Because of the complications of estimating soil vapor concentrations from groundwater concentrations, more weight was placed on soil vapor results for the interpretation of these results. This is consistent with the preference by DTSC (2011) for using soil vapor data to evaluate the VIP. While groundwater results for benzene and ethylbenzene indicate a potential risk for vapor intrusion from groundwater, soil vapor results do not. Minor risk exists for TPHg based on soil vapor. Additional soil gas sampling is recommended at VP-7 and VP-13. VP-7, which is in close proximity to MW-14 and which was not sampled due to an administrative error, would give further understanding with the potential vapor intrusion from groundwater at MW-14.

3.5.2.2 Commercial/Industrial Worker

The Site currently has one existing building in the northwest corner of the property with open bays. It is unlikely that current land use will change in the near future, therefore, hypothetical off-site commercial workers will have limited or no contact with off-site groundwater or soil gas because these areas are currently zoned for residential use. The maximum detected concentrations of on-site groundwater benzene and ethylbenzene exceeded their screening levels, while the maximum detected concentrations of benzene, ethylbenzene, and TPHg in on-site soil vapor exceeded the screening levels for the future and current on-site commercial/industrial worker scenario (Table 12 and 14).

The only on-site soil vapor location that exceeded the benzene screening level was VP-14 (Table 15) by factors of about 450 to 1,600. Concentrations at VP-14 dramatically decreased between the 3 and 5 fbg samples for both sampling events. For example, in April, the benzene concentration at 5 fbg was about 1,600 times the screening level while the concentration at 3 fbg was about 570 times the screening level. In August, the exceedance was about 660 and 450 times the screening level for the 5 and 3 fbg samples, respectively. Benzene concentrations at VP-3 saw a similar decreasing trend between the 5 and 3 fbg depths. It was noted that while no exceedances were detected at VP-3, reporting limits for benzene were raised for the 5 fbg. The raised reporting limits were above the screening level but the detected concentration at 3 fbg was well below the screening level. This indicates that soil vapor concentrations for benzene decreased closer to the surface under current conditions but additional sampling will be required to determine if this is a significant trend. Groundwater in the vicinity of VP-14 was reviewed in order to further develop on-site potential vapor intrusion concerns. VP-14 is located roughly between MW-4 and MW-5 (Figure 3). Groundwater locations (five wells along the western portion of the property and in the vicinity of VP-14, Figure 3 and Table 12) exceeded the

benzene screening level giving further indication that there is a potential risk for vapor intrusion if this area was redeveloped.

Detected concentrations of ethylbenzene in soil vapor exceeded the screening level at VP-14 at 5 fbg (Table 15). The magnitude of the exceedances was 10 and 19. Similar to benzene, the soil vapor concentrations decreased closer to the surface. VP-14 at 3 fbg was non-detect for both sampling events but the raised reporting limits were above the screening level. The raised reporting limits were more than half of the detected concentrations at 5 fbg. VP-3, which did not have any exceedances for ethylbenzene, also had raised reporting limits at 5 fbg. The raised reporting limits were above the screening level but the detected concentration at 3 fbg was well below the screening level (Table 15). Ethylbenzene in groundwater at two nearby on-site locations (MW-5 and V-2) slightly exceeded the groundwater screening level for vapor intrusion (Table 12). Groundwater gives further indication that potential risk of ethylbenzene for vapor intrusion may exist in the area around VP-14 if the area were to be developed. It is interesting to note, MW-6, the closest groundwater sample to VP-14, had detected concentrations that were well below the screening level (at least 10 times below the screening level at maximum concentration of 150 µg/L) of 3,100 µg/L (Table 15). These groundwater results support the conclusion that ethylbenzene may present a risk via vapor intrusion.

The maximum concentrations of TPHg in soil gas in locations VP-3 and VP-14 exceeded the screening level by factors of 100 and 320 (Table 15). VP-3 had both 3 and 5-foot depths sampled in August, with the lowest concentrations at the shallower depth. TPHg at 5 fbg was 108 times the screening level while the 3 fbg result was well below the screening level (0.016 times the screening level). Concentrations at VP-14 exceeded the screening level at both the 3 and 5 fbg. These concentrations varied slightly between sampling events and may be evidence of seasonal variation.

Benzene and ethylbenzene in on-site groundwater and soil vapor exceeded their respective screening levels for the current and future on-site commercial/industrial worker scenario. TPHg in soil vapor also exceeded the screening level for commercial/industrial worker. Shallow soil vapor results (3 fbg) indicate that there are less or no risks; particularly at VP-3, which indicate no risk for benzene, ethylbenzene, or TPHg. Conversely, results at VP-14 appear to indicate the potential for elevated risk to benzene, ethylbenzene, and TPHg if a future building was developed at that location.

The most recent soil vapor data is not in close proximity to the existing on-site building. There were several older soil vapor samples collected located closer to the existing on-site building. While these older data were deemed out dated and not representative of current conditions, general trends and conclusions can be drawn about the potential for vapor intrusion to the existing on-site building.

	Soil Vapor [1]		Closest Groundwater [2]	
Date	Sample Location	Exceedance of Commercial ESL	Sample Location	General Trend
May 2007	VP-1	Minor exceedance of TPHg and benzene, by a factor of 2 and 1, respectively	MW-5	Potential seasonal fluctuations but TPH and benzene concentrations have been decreasing since 2006
May 2007	VP-4	No exceedances	V-1	Potential seasonal fluctuations but TPH and benzene concentrations have been decreasing since 2006. No current exceedance of ESLs.
May 2007	VP-5	Unable to sample due to water in probe	None	--
May 2007	VP-6	Minor exceedance of TPHg by a factor of 1	MW-8	TPH and benzene have significantly decreased since 2008. Most recent data benzene data is well below the ESL.
April 2008		Minor exceedance of TPHg by a factor of 6		
November 2009		TPHg not analyzed		

Footnotes
[1] Historical soil vapor results are shown in Soil Vapor Sampling Report (GHD, 2015a).
[2] Historical groundwater results are shown in Groundwater Monitoring Report – Third Quarter 2015 (GHD, 2015b).

Minor exceedances were noted for TPHg and benzene in the historical soil vapor data within close proximity to the existing on-site building. Groundwater samples collected around the same time and within close proximity to the soil vapor probes moderately exceeded the screening levels for vapor intrusion. Concentrations of both TPHg and benzene have been decreasing in groundwater since the soil vapor samples were taken. Due to the low level of exceedance of older soil vapor data and the decreasing trend in groundwater concentrations, no risks are expected from vapor intrusion to the existing on-site building.

The results discussed above indicate that benzene, ethylbenzene and TPHg may present a potential risk to future commercial workers.

3.6 Uncertainty Assessment

This HHRA has been prepared in a manner consistent with general professional practice, and in accordance with RWQCB ESL guidance at the time it was prepared. The assessment is based on site-specific data, laboratory analytical results, and assumed exposure values and conditions. Although careful professional judgment was used in the selection of the assumptions and approaches used in this assessment, some discussion may be appropriate regarding their validity. The purpose of this section is to provide information concerning the validity of some of the assumptions and inputs, including their potential effect on the overall risk and reasonableness of the risk assessment.

3.6.1 Data Uncertainties

Uncertainties in the risk evaluation process may be associated with a potential to underestimate or overestimate risk. Some of the sources of uncertainty are discussed in this section.

While there were only two soil samples in the 0 to 3 fbg interval, it is expected that any contamination would be at deeper intervals as the source were USTs, which are buried deeper than 3 fbg. Additionally, the 0 to 3 fbg soil interval is currently covered with pavement and will continue to be covered for the foreseeable future, making it difficult and unlikely to come into contact with surface soil. Therefore, the lack of surface sample presents a minimal amount of uncertainty and is unlikely to change the conclusion of minimal risk from surface soil.

The soil data span from 1995 onward, and were recorded in units of mg/kg, but it was not recorded whether this was wet or dry weight. The laboratory reports included in various subsurface investigations also do not always note the basis of the reported results. If the soil data were reported on a wet weight basis, the reported maximum concentrations would underestimate the concentrations on a dry weight basis. However, the change in concentration from wet to dry weight would not significantly change the magnitude of any exceedances.

There was a limited amount of soil vapor data available to characterize the risk on-site. There were two off-site locations and two on-site soil vapor locations during two sampling events in 2015. All other soil vapor data were collected between 2007 and 2010, they were deemed too outdated to represent current site conditions. The 2015 soil vapor results had much higher concentrations than historical data. Based on the limited nature of recent soil vapor data, there is some uncertainty about the current on-site subsurface conditions.

Tables 16 through 18 evaluated data quality. There were a number of soil PAHs where the maximum method reporting limit exceeded the minimum soil screening level (Table 16). However, as previously discussed in Section 3.5.1.1, ACEH has acknowledged that PAHs are likely not related to former service station operations. The reporting limit exceedances of the soil screening levels therefore present minimal uncertainty about the risk conclusions presented by contamination from former service station operations. All maximum groundwater method reporting limits were well below all available screenings levels (Table 17).

There were also several soil vapor analytes where the maximum method reporting limit exceeded the minimum soil vapor screening level (Table 18). Two of these analytes, total xylenes and naphthalene, were not detected in any 2015 soil vapor samples. It is noted that the maximum reporting limits were elevated due to dilution of the sample. These elevated reporting limits introduce some uncertainty into the risk results, but the degree of uncertainty is considered minor due to their limited occurrence.

3.6.2 Exposure Assessment Uncertainties

Risk assessments utilize assumptions in order to assess potential human exposure in the absence of site-specific data. This risk assessment includes assumptions about general characteristics and potential patterns of human exposure to the receptors evaluated in this HHRA. The assumptions made in this assessment were based on RWQCB and EPA guidance. While these assumptions introduce some uncertainty into the assessment process, the health-protectiveness they provide is considered appropriate for screening-levels assessments such as this.

3.6.3 Toxicity Assessment Uncertainties

Sources of uncertainty related directly to toxicity data include:

- The use of dose-response data from experiments on homogeneous, sensitive animal populations to predict effects in heterogeneous human populations with a wide range of sensitivities.
- Extrapolation of data from: (1) high-dose animal studies to low-dose human exposures; (2) acute or sub-chronic to chronic exposure; and (3) one exposure route to another (e.g. from ingestion to inhalation or dermal absorption).
- Use of single-chemical test data that do not account for multiple exposures or synergistic and antagonistic responses.

Because of these sources of uncertainty, "uncertainty factors" are incorporated into published toxicity values and, therefore, they would err on the side of being health-protective.

3.6.4 Summary

There were several sources of uncertainties in this assessment. The primary sources were the use of maximum detected concentrations, the use of upper-bound assumptions incorporated into the ESLs, and the assumption that exposure would take place in future scenarios when this is not likely in the foreseeable future. The overall effect of these uncertainties is to introduce a level of health protectiveness that is appropriate for a screening-level assessment.

4 Limitations

The conclusions, if any, presented in this Report are professional opinions based solely upon the data described in this report. They are intended exclusively for the purpose outlined herein and the Site location and project indicated. This report is for the sole use and benefit of the Client. The scope of services performed in execution of this effort may not be appropriate to satisfy the needs of other users, and any use or reuse of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of said user. No express or implied representation or warranty is included or intended in this report except that the work was performed within the limits prescribed by the Client with the customary thoroughness and competence of professionals working in the same area on similar projects.

5 Summary and Conclusions

The purpose of this investigation was to assess soil vapor concentrations for site characterization and estimate potential health risks to current and future commercial/industrial workers, future excavation workers, hypothetical future on-site residents, and current off-site residents. A human health risk assessment for direct contact with soil and vapor intrusion of volatiles into indoor air was completed using maximum detected concentrations of VOCs, TPH, and lead from soil, groundwater, and soil vapor data.

Exposure Routes	Current/Future Receptors			
	On-Site			Off-Site
	Commercial/ Industrial Worker	Construction/ Excavation Worker	Hypothetical Resident	Resident
Inhalation Outdoor Air (Particles)	NA	-No unacceptable risk -Minor exceedances of ESL not related to site activities	-No unacceptable risk -Minor exceedances of ESL not related to site activities	NA
Inhalation Indoor Air	-No unacceptable risk to current workers based on qualitative review of older data near existing building (Section 3.5.2.2) -Possible unacceptable risk would exist if new buildings are developed at VP-3 and VP-14 (Table 12, 14, and 15)	NA	-Unacceptable risk would exist if site use changes at VP-14 (Table 11, 13, and 15), though this scenario is considered unlikely	- No unacceptable risk (below selected ESLs) (Table 11, 13, and 15) -Verification of VP-7 and VP-13 is needed
Incidental Ingestion of Soil	-No unacceptable risk (Table 9) -Minor exceedances of ESL not related to site activities	-No unacceptable risk (Table 10) -Minor exceedances of ESL not related to site activities	-No unacceptable risk (Table 8) -Minor exceedances of ESL not related to site activities	NA
Dermal Contact with Soil	-No unacceptable risk (Table 9) -Minor exceedances of ESL not related to site activities	-No unacceptable risk (Table 10) -Minor exceedances of ESL not related to site activities	-No unacceptable risk (Table 8) -Minor exceedances of ESL not related to site activities	NA
Footnotes NA = not applicable				

Based on the results of the risk assessment (Tables 8 through 15), on-site sources may potentially pose unacceptable risk for vapor intrusion health risks to future commercial/industrial workers. There appears to be no significant direct contact risk to current or future receptors. There also appears to be no significant vapor intrusion risk to current or future off-site residents or current on-site commercial/industrial workers.

Further confirmation of off-site vapor intrusion is recommended. Specifically, AECOM recommends resampling soil vapor probes VP-7 and VP-13.

Based on the results of this HHRA, it appears that corrective action may be warranted to address future potential site uses and so that site conditions will satisfy the State Water Resources Control Board *Low-Threat Underground Storage Tank Case Closure Policy* ("the Policy"). Because it was prepared prior to the Policy's implementation and the preparation of this HHRA, AECOM does not recommend implementing the 2008

Corrective Action Plan submitted by Conestoga-Rovers & Associates. We recommend preparing a revised corrective action plan that is consistent with the remedial goals in the Policy and adequately protects the receptors identified in this HHRA.

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Tables

Former Shell Service Station
2703 Martin Luther King Jr. Way
Oakland, California

Table 1. Summary Statistics - Soil 0-3 fbg

Analyte	No. of Samples	Detection Rate	Summary Statistics		Detected		Non-detect		Distribution	Upper Confidence Limit (UCL)	
			Mean	Std Dev	Min	Max	Min	Max		Method of UCL Calculation	Assessed 95% UCL
BTEX and Fuel Oxygenates											
Benzene	2	0%	--	--	--	--	0.005	0.005	--	--	--
Ethylbenzene	2	0%	--	--	--	--	0.005	0.005	--	--	--
Toluene	2	0%	--	--	--	--	0.005	0.005	--	--	--
Total Xylenes	2	0%	--	--	--	--	0.005	0.005	--	--	--
MTBE	2	0%	--	--	--	--	0.5	0.5	--	--	--
PAHs											
1-Methylnaphthalene	25	4%	--	--	0.029	0.029	0.02	0.33	--	--	--
2-Methylnaphthalene	30	3%	--	--	0.042	0.042	0.02	6.6	--	--	--
Acenaphthene	40	0%	--	--	--	--	0.02	6.6	--	--	--
Acenaphthylene	40	3%	--	--	0.048	0.048	0.02	6.6	--	--	--
Anthracene	40	10%	0.026	0.00815	0.026	0.055	0.02	6.6	normal	95% KM (t) UCL	0.0306
Benzo(a)Anthracene	40	28%	0.0581	0.0541	0.047	0.22	0.02	6.6	normal	95% KM (t) UCL	0.0763
Benzo(a)Pyrene	40	33%	0.114	0.27	0.043	1.7	0.02	6.6	lognormal	95% KM (t) UCL	0.192
Benzo(b)Fluoranthene	40	35%	0.116	0.315	0.027	2	0.02	6.6	lognormal	95% KM (BCA) UCL	0.228
Benzo(g,h,i)Perylene	40	28%	0.126	0.38	0.024	2.4	0.02	6.6	lognormal	95% KM (BCA) UCL	0.284
Benzo(k)Fluoranthene	40	28%	0.0522	0.0459	0.035	0.19	0.02	6.6	normal	95% KM (t) UCL	0.0678
Bis(2-ethylhexyl) phthalate	20	35%	0.674	1.428	0.0683	5.6	0.067	6.6	normal	95% KM (t) UCL	1.287
Chrysene	40	30%	0.0925	0.166	0.052	1	0.02	6.6	gamma	95% KM (t) UCL	0.142
Dibenz(a,h)Anthracene	40	5%	0.0222	0.00489	0.022	0.035	0.02	8.4	non-parametric	95% KM (t) UCL	0.0264
Diethyl Phthalate	20	20%	0.0651	0.00909	0.0595	0.0788	0.056	6.6	normal	95% KM (t) UCL	0.0725
Fluoranthene	40	33%	0.118	0.233	0.054	1.4	0.02	6.6	lognormal	95% KM (t) UCL	0.186
Fluorene	40	0%	--	--	--	--	0.02	6.6	--	--	--
Indeno(1,2,3-c,d)Pyrene	40	23%	0.0917	0.268	0.025	1.7	0.02	6.6	lognormal	95% KM (BCA) UCL	0.188
Naphthalene	40	5%	0.0235	0.0112	0.02	0.059	0.02	6.6	non-parametric	95% KM (t) UCL	0.0316
Phenanthrene	40	23%	0.0633	0.0671	0.048	0.26	0.02	6.6	normal	95% KM (t) UCL	0.0864
Pyrene	40	38%	0.149	0.27	0.07	1.6	0.02	6.6	lognormal	95% KM (t) UCL	0.227
TPHs											
TPHg	2	0%	--	--	--	--	1	1	--	--	--
TPHd	41	85%	50.77	76.76	2.55	430	2.4	10	gamma	95% KM (Chebyshev) UCL	103.8
TPHmo	41	68%	129	237.9	8.3	1,200	4.8	25	lognormal	95% KM (Chebyshev) UCL	293.9

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Table 1. Summary Statistics - Soil 0-3 fbg

Analyte	No. of Samples	Detection Rate	Summary Statistics		Detected		Non-detect		Distribution	Upper Confidence Limit (UCL)	
			Mean	Std Dev	Min	Max	Min	Max		Method of UCL Calculation	Assessed 95% UCL
Metal											
Lead	45	100%	940.2	1,761	6.4	10,000	--	--	gamma	95% Adjusted Gamma UCL	1,462
On-site											
Benzo(a)Pyrene	19	11%	0.0431	0.0227	0.0868	0.1	0.033	0.45	non-parametric	95% KM (t) UCL	0.0591
Benzo(b)Fluoranthene	19	11%	0.0422	0.0205	0.0858	0.09	0.033	0.45	non-parametric	95% KM (t) UCL	0.0566
Indeno(1,2,3-c,d)Pyrene	19	0%	--	--	--	--	0.042	0.45	--	--	--
TPHd	19	89%	20.12	23.46	2.55	89	2.4	2.5	gamma	95% KM (Chebyshev) UCL	44.3
Lead	23	100%	214.8	316.8	6.4	1,100	--	--	non-parametric	95% Chebyshev (Mean, Sd) UCL	502.8
Off-site											
Benzo(a)Pyrene	21	52%	0.197	0.364	0.043	1.7	0.02	6.6	lognormal	95% KM (t) UCL	0.349
Benzo(b)Fluoranthene	21	57%	0.195	0.431	0.027	2	0.02	6.6	lognormal	97.5% KM (Chebyshev) UCL	0.841
Indeno(1,2,3-c,d)Pyrene	21	43%	0.158	0.367	0.025	1.7	0.02	6.6	lognormal	95% KM (BCA) UCL	0.345
TPHd	22	82%	77.57	94.58	7.8	430	5	10	normal	95% KM (t) UCL	113.3
Lead	22	100%	1,699	2,283	38	10,000	--	--	gamma	95% Adjusted Gamma UCL	2,905

Notes

All soil analytical results are reported in mg/kg.
If the dataset contains nondetects, summary statistics estimated by the Kaplan-Meier (KM) method.
Summary statistics are censored at the reporting limit.
Summary statistics are shown only if there are 8 or more samples.

Acronyms

% = percent
-- = no data
fbg = feet below grade
mg/kg = milligrams per kilogram
min = minimum
max = maximum
No. = number
Std Dev = standard deviation
UCL = upper confidence limit
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
MTBE = methyl tert-butyl ether
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
TPHmo = total petroleum hydrocarbons as motor oil

References

USEPA. 2013a. ProUCL Version 5.0.00 Technical Guide. Office of Research and Development,
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USEPA. 2013b. ProUCL Version 5.0.00 User Guide. Office of Research and Development,
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USEPA. 2013c. ProUCL Version 5.0.00 (Software). Retrieved from http://www2.epa.gov/land-research/proucl-software. September.

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Table 2. Summary Statistics - Soil 0-10 fbg

Analyte	No. of Samples	Detection Rate	Summary Statistics		Detected Values		Non-detect Reporting Limits		Distribution	Upper Confidence Limit (UCL)	
			Mean	Std Dev	Min	Max	Min	Max		Method of UCL Calculation	Assessed 95% UCL
BTEX and Fuel Oxygenates											
Benzene	118	19%	0.991	6.803	0.00096	72	0.00099	10	gamma	95% KM (t) UCL	2.054
Ethylbenzene	118	40%	7.606	28.48	0.00084	270	0.00099	2.5	gamma	95% KM (t) UCL	12
Toluene	118	8%	3.408	29.85	0.00084	320	0.00099	10	gamma	95% KM (t) UCL	8.24
Total Xylenes	118	36%	31.05	140.4	0.0015	1,400	0.002	5	gamma	95% KM (t) UCL	52.74
DIPE	1	0%	--	--	--	--	0.01	0.01	--	--	--
ETBE	1	0%	--	--	--	--	0.01	0.01	--	--	--
MTBE	22	9%	0.355	1.603	0.007	7.7	0.005	0.5	non-parametric	99% KM (Chebyshev) UCL	5.163
TAME	1	0%	--	--	--	--	0.01	0.01	--	--	--
TBA	11	0%	--	--	--	--	0.005	0.05	--	--	--
PAHs											
1-Methylnaphthalene	38	3%	--	--	0.029	0.029	0.02	0.33	--	--	--
2-Methylnaphthalene	43	2%	--	--	0.042	0.042	0.02	6.6	--	--	--
Acenaphthene	58	0%	--	--	--	--	0.02	6.6	--	--	--
Acenaphthylene	58	2%	--	--	0.048	0.048	0.02	6.6	--	--	--
Anthracene	58	7%	0.0221	0.00626	0.026	0.055	0.02	6.6	normal	95% KM (t) UCL	0.0243
Benzo(a)Anthracene	58	19%	0.0425	0.0463	0.047	0.22	0.02	6.6	normal	95% KM (t) UCL	0.0545
Benzo(a)Pyrene	58	22%	0.0806	0.227	0.043	1.7	0.02	6.6	lognormal	95% KM (t) UCL	0.134
Benzo(b)Fluoranthene	58	24%	0.0813	0.264	0.027	2	0.02	6.6	lognormal	95% KM (BCA) UCL	0.154
Benzo(g,h,i)Perylene	58	19%	0.0879	0.317	0.024	2.4	0.02	6.6	lognormal	95% KM (BCA) UCL	0.182
Benzo(k)Fluoranthene	58	19%	0.0388	0.0392	0.035	0.19	0.02	6.6	normal	95% KM (t) UCL	0.049
Bis(2-ethylhexyl) phthalate	20	35%	0.674	1.428	0.0683	5.6	0.067	6.6	normal	95% KM (t) UCL	1.287
Chrysene	58	21%	0.0657	0.14	0.052	1	0.02	6.6	gamma	95% KM (t) UCL	0.0991
Dibenz(a,h)Anthracene	58	3%	0.0207	0.00295	0.022	0.035	0.02	8.4	non-parametric	95% KM (t) UCL	0.0221
Diethyl Phthalate	20	20%	0.0651	0.00909	0.0595	0.0788	0.056	6.6	normal	95% KM (t) UCL	0.0725
Fluoranthene	58	22%	0.0835	0.197	0.054	1.4	0.02	6.6	lognormal	95% KM (t) UCL	0.13
Fluorene	58	0%	--	--	--	--	0.02	6.6	--	--	--
Indeno(1,2,3-c,d)Pyrene	58	16%	0.0656	0.224	0.025	1.7	0.02	6.6	lognormal	95% KM (BCA) UCL	0.128
Naphthalene	58	3%	0.0213	0.00712	0.02	0.059	0.02	6.6	non-parametric	95% KM (t) UCL	0.0245
Phenanthrene	58	16%	0.0446	0.0569	0.048	0.26	0.02	6.6	normal	95% KM (t) UCL	0.0595
Pyrene	58	26%	0.104	0.231	0.07	1.6	0.02	6.6	lognormal	95% KM (t) UCL	0.158

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Table 2. Summary Statistics - Soil 0-10 fbg

Analyte	No. of Samples	Detection Rate	Summary Statistics		Detected Values		Non-detect Reporting Limits		Distribution	Upper Confidence Limit (UCL)	
			Mean	Std Dev	Min	Max	Min	Max		Method of UCL Calculation	Assessed 95% UCL
TPHs											
TPHg	118	55%	577	1,842	1	17,000	0.099	50	gamma	95% KM (BCA) UCL	914.1
TPHd	59	64%	39.17	68.32	2.55	430	2.4	10	gamma	95% KM (BCA) UCL	54.87
TPHmo	59	53%	100	206.3	8.3	1,200	4.8	25	gamma	95% KM (BCA) UCL	145.1
Metal											
Lead	69	100%	631.1	1,481	5.4	10,000	--	--	non-parametric	95% Chebyshev (Mean, Sd) UCL	1,408

Notes
All soil analytical results are reported in mg/kg.
If the dataset contains nondetects, summary statistics estimated by the Kaplan-Meier (KM) method.
Summary statistics are censored at the reporting limit.
Summary statistics are shown only if there are 8 or more samples.

Acronyms
% = percent
-- = no data
fbg = feet below grade
mg/kg = milligrams per kilogram
min = minimum
max = maximum
No. = number
Std Dev = standard deviation
UCL = upper confidence limit
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
DIPE = diisopropyl ether
ETBE = ethyl tert-butyl ether
MTBE = methyl tert-butyl ether
TAME = tert-amyl methyl ether
TBA = tert-Butyl alcohol
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
TPHmo = total petroleum hydrocarbons as motor oil

References
USEPA. 2013a. ProUCL Version 5.0.00 Technical Guide. Office of Research and Development, U.S. Environmental Protection Agency, Report No. EPA/600/R-07/041. Sept
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Table 3. Summary Statistics - Groundwater

Analyte	No. of Samples	Detection Rate	Summary Statistics		Detected Values		Non-detect Reporting Limits	
			Mean	Std Dev	Min	Max	Min	Max
BTEX and Fuel Oxygenates								
Benzene	43	86%	889.1	1,541	1.1	6,200	0.5	5
Ethylbenzene	43	81%	1,014	1,833	1.5	5,900	0.5	5
Toluene	43	56%	472.8	1,433	2.5	5,800	0.5	50
Total Xylenes	43	67%	2,830	7,569	2.3	31,000	1	40
DIPE	14	14%	2.455	4.575	2.3	16	0.5	50
ETBE	14	0%	--	--	--	--	0.5	50
MTBE	14	0%	--	--	--	--	0.5	50
TAME	14	0%	--	--	--	--	0.5	50
TBA	14	0%	--	--	--	--	10	1,000
TPHs								
TPHg	43	91%	17,806	28,014	50	99,000	50	50
On-site								
Benzene	30	93%	1,107	1,769	1.1	6,200	0.5	5
Ethylbenzene	30	87%	1,157	2,048	1.5	5,900	0.5	5
Off-site								
Benzene	13	69%	385.8	516.3	1.3	1,600	0.5	0.5
Ethylbenzene	13	69%	684.3	1,130	8.5	2,800	0.5	0.5

Notes
All groundwater analytical results are reported in ug/L.
If the dataset contains nondetects, summary statistics estimated by the Kaplan-Meier (KM) method.
Summary statistics are censored at the reporting limit.
Summary statistics are shown only if there are 8 or more samples.

Acronyms

% = percent
-- = no data
ug/L = micrograms per liter
min = minimum
max = maximum
No. = number
Std Dev = standard deviation
UCL = upper confidence limit
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
DIPE = diisopropyl ether
ETBE = ethyl tert-butyl ether
MTBE = methyl tert-butyl ether
TAME = tert-amyl methyl ether
TBA = tert-Butyl alcohol
TPHg = total petroleum hydrocarbons as gasoline

References

USEPA. 2013a. ProUCL Version 5.0.00 Technical Guide. Office of Research and Development, U.S. Environmental Protection Agency, Report No. EPA/600/R-07/041. September.

USEPA. 2013b. ProUCL Version 5.0.00 User Guide. Office of Research and Development, U.S. Environmental Protection Agency, Report No. EPA/600/R-07/041. September.

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Table 4. Summary Statistics - Soil Vapor

Analyte	No. of Samples	Detection Rate	Summary Statistics		Detected Values		Non-detect Reporting Limits	
			Mean	Std Dev	Min	Max	Min	Max
Benzene	15	40%	93,409	185,710	50	690,000	16	16,000
Ethylbenzene	15	20%	9,486	25,548	22	94,000	22	27,000
Toluene	15	0%	--	--	--	--	19	30,000
Total Xylenes	15	0%	--	--	--	--	22	35,000
Naphthalene	15	0%	--	--	--	--	52	84,000
TPHg	15	100%	147,400,000	226,000,000	35,000	800,000,000	--	--
On-site								
Benzene	7	71%	--	--	50	690,000	16,000	16,000
Ethylbenzene	7	43%	--	--	22	94,000	22,000	27,000
TPHg	7	100%	--	--	41,000	800,000,000	--	--
Off-site								
Benzene	8	13%	--	--	770	770	16	16
Ethylbenzene	8	0%	--	--	--	--	22	220
TPHg	8	100%	204,500	160,456	35,000	540,000	--	--

Notes

All soil vapor analytical results are reported in ug/m^3.
If the dataset contains nondetects, summary statistics estimated by the Kaplan-Meier (KM) method.
Summary statistics are censored at the reporting limit.
Summary statistics are shown only if there are 8 or more samples.

Acronyms

% = percent
-- = no data
ug/m^3 = micrograms per cubic meter
min = minimum
max = maximum
No. = number
Std Dev = standard deviation
TPHg = total petroleum hydrocarbons as gasoline

References

USEPA. 2013a. ProUCL Version 5.0.00 Technical Guide. Office of Research and Development, U.S. Environmental Protection Agency, Report No. EPA/600/R-07/041.
USEPA. 2013b. ProUCL Version 5.0.00 User Guide. Office of Research and Development, U.S. Environmental Protection Agency, Report No. EPA/600/R-07/041.
USEPA. 2013c. ProUCL Version 5.0.00 (Software). Retrieved from http://www2.epa.gov/land-research/proucl-software. September.

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Table 5. Soil Screening Levels

Analyte	Residential ESL	Commercial ESL	Construction ESL
BTEX and Fuel Oxygenates			
Benzene	0.74	3.7	71
Ethylbenzene	4.8	24	490
Toluene	1,000	4,900	4,300
Total Xylenes	600	2,600	2,500
DIPE	NA	NA	NA
ETBE	NA	NA	NA
MTBE	39	190	3,800
TAME	NA	NA	NA
TBA	NV	NV	NV
PAHs			
1-Methylnaphthalene	NA	NA	NA
2-Methylnaphthalene	230	2,200	570
Acenaphthene	3,400	15,000	8,600
Acenaphthylene	NV	NV	NV
Anthracene	23,000	170,000	43,000
Benzo(a)Anthracene	0.38	1.3	8.3
Benzo(a)Pyrene	0.038	0.13	0.83
Benzo(b)Fluoranthene	0.38	1.3	8.3
Benzo(g,h,i)Perylene	NV	NV	NV
Benzo(k)Fluoranthene	0.38	1.3	8.3
Bis(2-ethylhexyl) phthalate	160	570	3,300
Chrysene	3.8	13	83
Dibenz(a,h)Anthracene	0.11	0.38	2.4
Diethyl Phthalate	49,000	490,000	130,000
Fluoranthene	2,300	22,000	5,700
Fluorene	3,100	22,000	5,700
Indeno(1,2,3-c,d)Pyrene	0.38	1.3	8.3
Naphthalene	3.1	15	370
Phenanthrene	NV	NV	NV
Pyrene	3,400	33,000	8,600

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Table 5. Soil Screening Levels

Analyte	Residential ESL	Commercial ESL	Construction ESL
TPHs			
TPHg	770	4,000	2,700
TPHd	240	1,100	900
TPHmo	10,000	100,000	28,000
Metal			
Lead	80	320	320

Notes
All soil concentrations are reported in mg/kg dw.

Acronyms
NA = no available screening level
NV = no value
ESL = environmental screening level
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
DIPE = diisopropyl ether
ETBE = ethyl tert-butyl ether
MTBE = methyl tert-butyl ether
TAME = tert-amyl methyl ether
TBA = tert-Butyl alcohol
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
TPHmo = total petroleum hydrocarbons as motor oil

References
San Francisco Regional Water Quality Control Board. 2013. Environmental Screening Levels. December.
Table K-3. Direct Exposure Soil Screening Levels Construction/Trench Worker Exposure Scenario.
Table K-2. Direct Exposure Soil Screening Levels Commercial/Industrial Worker Exposure Scenario.
Table K-1. Direct Exposure Soil Screening Levels Residential Exposure Scenario.

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Table 6. Groundwater Screening Levels

Analyte	Residential ESL	Commercial ESL
BTEX and Fuel Oxygenates		
Benzene	27	270
Ethylbenzene	310	3,100
Toluene	95,000	Sample Soil Gas
Total Xylenes	37,000	Sample Soil Gas
DIPE	NA	NA
ETBE	NA	NA
MTBE	9,900	100,000
TAME	NA	NA
TBA	NA	NA
TPH		
TPHg	NV	NV

Notes
All groundwater concentrations are reported in ug/L.

Acronyms
NA = no available screening level
NV = no value
ESL = environmental screening level
ug/L = micrograms per liter
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
DIPE = diisopropyl ether
ETBE = ethyl tert-butyl ether
MTBE = methyl tert-butyl ether
TAME = tert-amyl methyl ether
TBA = tert-Butyl alcohol
TPHg = total petroleum hydrocarbons as gasoline

References

San Francisco Regional Water Quality Control Board. 2013. Environmental Screening Levels. December.

Table E-1. Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion (volatile chemicals only). Fine-Coarse Mix. Commercial/Industrial Land Use.

Table E-1. Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion (volatile chemicals only). Fine-Coarse Mix. Residential Land Use.

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Table 7. Soil Vapor Screening Levels

Analyte	Residential ESL	Commercial ESL
Benzene	42	420
Ethylbenzene	490	4,900
Toluene	160,000	1,300,000
Total Xylenes	52,000	440,000
Naphthalene	36	360
TPHg	300,000	2,500,000

Notes

All soil vapor analytical results are reported in ug/m^3.

Acronyms

ug/m^3 = micrograms per cubic meter
ESL = environmental screening level
TPHg = total petroleum hydrocarbons as gasoline

References

San Francisco Regional Water Quality Control Board. 2013. Environmental Screening Levels. December.

Table E-2. Soil Gas Screening Levels for Evaluation of Potential Vapor Intrusion (volatile chemicals only). Commercial/Industrial Land Use.

Table E-2. Soil Gas Screening Levels for Evaluation of Potential Vapor Intrusion (volatile chemicals only). Residential Land Use.

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Table 8. Soil Screening for Direct Contact - Resident, 0-3 fbg

Analyte	No. of Samples	Detection Rate	Location	Max	Residential SL	Max > SL?	Magnitude of Max	Location of Max	Depth of Max (fbg)	No. of Exceedances	Location of Exceedances
PAHs											
1-Methylnaphthalene	25	4%	Site-wide	0.029	NA	No	--	--	--	--	--
2-Methylnaphthalene	30	3%	Site-wide	0.042	230	No	--	--	--	--	--
Acenaphthylene	40	3%	Site-wide	0.048	NV	No	--	--	--	--	--
Anthracene	40	10%	Site-wide	0.055	23,000	No	--	--	--	--	--
Benzo(a)Anthracene	40	28%	Site-wide	0.22	0.38	No	--	--	--	--	--
Benzo(a)Pyrene	40	33%	On-site	0.1	0.038	Yes	3	N-3	2	2	B-5, N-3
			Off-site	1.7	0.038	Yes	45	HA-10	0	11	HA-9 through HA-14
Benzo(b)Fluoranthene	40	35%	On-site	0.09	0.38	No	--	--	--	--	--
			Off-site	2.0	0.38	Yes	5	HA-10	0	1	HA-10
Benzo(g,h,i)Perylene	40	28%	Site-wide	2.4	NV	No	--	--	--	--	--
Benzo(k)Fluoranthene	40	28%	Site-wide	0.19	0.38	No	--	--	--	--	--
Bis(2-ethylhexyl) phthalate	20	35%	Site-wide	5.6	160	No	--	--	--	--	--
Chrysene	40	30%	Site-wide	1	3.8	No	--	--	--	--	--
Dibenz(a,h)Anthracene	40	5%	Site-wide	0.035	0.11	No	--	--	--	--	--
Diethyl Phthalate	20	20%	Site-wide	0.079	49,000	No	--	--	--	--	--
Fluoranthene	40	33%	Site-wide	1.4	2,300	No	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	40	23%	On-site	ND	0.38	No	--	--	--	--	--
			Off-site	1.7	0.38	Yes	4	HA-10	0	1	HA-10
Naphthalene	40	5%	Site-wide	0.059	3.1	No	--	--	--	--	--
Phenanthrene	40	23%	Site-wide	0.26	NV	No	--	--	--	--	--
Pyrene	40	38%	Site-wide	1.6	3,400	No	--	--	--	--	--
TPHs											
TPHd	41	85%	On-site	89	240	No	--	--	--	--	--
			Off-site	430	240	Yes	2	HA-10	1	1	HA-10
TPHmo	41	68%	Site-wide	1,200	10,000	No	--	--	--	--	--

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Table 8. Soil Screening for Direct Contact - Resident, 0-3 fbg

Analyte	No. of Samples	Detection Rate	Location	Max	Residential SL	Max > SL?	Magnitude of Max	Location of Max	Depth of Max (fbg)	No. of Exceedances	Location of Exceedances
Metal											
Lead	45	100%	On-site	1,100	80	Yes	14	HA-16	0	11	B-4, B-5, HA-16, HA-18, MW-13, N-1, N-3, VP-12, VP-13
			Off-site	10,000	80	Yes	125	HA-19	0	20	HA-9 through HA-15, HA-17, HA-19 throught HA-24

Notes

Only detected results are shown and all soil analytical results are reported in mg/kg.

Shading indicates the maximum concentration of the analyte exceeded its respective screening level.

Acronyms

-- = no data
NA = no available screening level
NV = no value
fbg = feet below grade
mg/kg = milligrams per kilogram
max = maximum
No. = number
PAH = polycyclic aromatic hydrocarbons
SL = screening level
TPH = total petroleum hydrocarbons
TPHd = total petroleum hydrocarbons as diesel
TPHmo = total petroleum hydrocarbons as motor oil

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Table 9. Soil Screening for Direct Contact - Commercial/Industrial Worker, 0-3 fbg

Analyte	No. of Samples	Detection Rate	Location	Max	Commercial SL	Max > SL?	Magnitude of Max	Location of Max	Depth of Max (fbg)	No. of Exceedances	Location of Exceedances
PAHs											
1-Methylnaphthalene	25	4%	Site-wide	0.029	NA	No	--	--	--	--	--
2-Methylnaphthalene	30	3%	Site-wide	0.042	2,200	No	--	--	--	--	--
Acenaphthylene	40	3%	Site-wide	0.048	NV	No	--	--	--	--	--
Anthracene	40	10%	Site-wide	0.055	170,000	No	--	--	--	--	--
Benzo(a)Anthracene	40	28%	Site-wide	0.22	1.3	No	--	--	--	--	--
Benzo(a)Pyrene	40	33%	On-site	0.1	0.13	No	--	--	--	--	--
			Off-site	1.7	0.13	Yes	13	HA-10	0	8	HA-9 through HA-14
Benzo(b)Fluoranthene	40	35%	On-site	0.09	1.3	No	--	--	--	--	--
			Off-site	2.0	1.3	Yes	2	HA-10	0	1	HA-10
Benzo(g,h,i)Perylene	40	28%	Site-wide	2.4	NV	No	--	--	--	--	--
Benzo(k)Fluoranthene	40	28%	Site-wide	0.19	1.3	No	--	--	--	--	--
Bis(2-ethylhexyl) phthalate	20	35%	Site-wide	5.6	570	No	--	--	--	--	--
Chrysene	40	30%	Site-wide	1	13	No	--	--	--	--	--
Dibenz(a,h)Anthracene	40	5%	Site-wide	0.035	0.38	No	--	--	--	--	--
Diethyl Phthalate	20	20%	Site-wide	0.0788	490,000	No	--	--	--	--	--
Fluoranthene	40	33%	Site-wide	1.4	22,000	No	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	40	23%	On-site	ND	1.3	No	--	--	--	--	--
			Off-site	1.7	1.3	Yes	1	HA-10	0	Maximum detected result is equivalent to the SL	
Naphthalene	40	5%	Site-wide	0.059	15	No	--	--	--	--	--
Phenanthrene	40	23%	Site-wide	0.26	NV	No	--	--	--	--	--
Pyrene	40	38%	Site-wide	1.6	33,000	No	--	--	--	--	--

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Table 9. Soil Screening for Direct Contact - Commercial/Industrial Worker, 0-3 fbg

TPHs											
TPHd	41	85%	Site-wide	430	1,100	No	--	--	--	--	--
TPHmo	41	68%	Site-wide	1,200	100,000	No	--	--	--	--	--
Metal											
Lead	45	100%	On-site	1,100	320	Yes	3	HA-16	0	4	HA-16, HA-18, N-3
			Off-site	10,000	320	Yes	31	HA-19	0	16	HA-9 through HA-15, HA-17, HA-19, HA-21 through HA-24

Notes
Only detected results are shown and all soil analytical results are reported in mg/kg.
Shading indicates the maximum concentration of the analyte exceeded its respective screening level.

Acronyms
-- = no data
NA = no available screening level
ND = not detected
NV = no value
fbg = feet below grade
mg/kg = milligrams per kilogram
max = maximum
No. = number
PAH = polycyclic aromatic hydrocarbons
SL = screening level
TPH = total petroleum hydrocarbons
TPHd = total petroleum hydrocarbons as diesel
TPHmo = total petroleum hydrocarbons as motor oil

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Table 10. Soil Screening for Direct Contact - Construction Worker, 0-10 fbg

Analyte	No. of Samples	Detection Rate	Location	Max	Construction SL	Max > SL?	Magnitude of Max	Location of Max	Depth of Max (fbg)	No. of Exceedances	Location of Exceedances
BTEX and Fuel Oxygenates											
Benzene	118	19%	Site-wide	72	71	Yes	1	B-42	10	aximum detected result is equivalent to the S	
Ethylbenzene	118	40%	Site-wide	270	490	No	--	--	--	--	--
Toluene	118	8%	Site-wide	320	4,300	No	--	--	--	--	--
Total Xylenes	118	36%	Site-wide	1,400	2,500	No	--	--	--	--	--
MTBE	22	9%	Site-wide	7.7	3,800	No	--	--	--	--	--
PAHs											
1-Methylnaphthalene	38	3%	Site-wide	0.029	NA	No	--	--	--	--	--
2-Methylnaphthalene	43	2%	Site-wide	0.042	570	No	--	--	--	--	--
Acenaphthylene	58	2%	Site-wide	0.048	NV	No	--	--	--	--	--
Anthracene	58	7%	Site-wide	0.055	43,000	No	--	--	--	--	--
Benzo(a)Anthracene	58	19%	Site-wide	0.22	8.3	No	--	--	--	--	--
Benzo(a)Pyrene	58	22%	Site-wide	1.7	0.83	Yes	2	HA-10	0	1	HA-10
Benzo(b)Fluoranthene	58	24%	Site-wide	2	8.3	No	--	--	--	--	--
Benzo(g,h,i)Perylene	58	19%	Site-wide	2.4	NV	No	--	--	--	--	--
Benzo(k)Fluoranthene	58	19%	Site-wide	0.19	8.3	No	--	--	--	--	--
Bis(2-ethylhexyl) phthalate	20	35%	Site-wide	5.6	3,300	No	--	--	--	--	--
Chrysene	58	21%	Site-wide	1	83	No	--	--	--	--	--
Dibenz(a,h)Anthracene	58	3%	Site-wide	0.035	2.4	No	--	--	--	--	--
Diethyl Phthalate	20	20%	Site-wide	0.0788	130,000	No	--	--	--	--	--
Fluoranthene	58	22%	Site-wide	1.4	5,700	No	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	58	16%	Site-wide	1.7	8.3	No	--	--	--	--	--
Naphthalene	58	3%	Site-wide	0.059	370	No	--	--	--	--	--
Phenanthrene	58	16%	Site-wide	0.26	NV	No	--	--	--	--	--
Pyrene	58	26%	Site-wide	1.6	8,600	No	--	--	--	--	--

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Table 10. Soil Screening for Direct Contact - Construction Worker, 0-10 fbg

TPHs											
TPHg	118	55%	Site-wide	17,000	2,700	Yes	6	B-42	10	6	B-40, B-41, B-42, GP-3
TPHd	59	64%	Site-wide	430	900	No	--	--	--	--	--
TPHmo	59	53%	Site-wide	1,200	28,000	No	--	--	--	--	--
Metal											
Lead	69	100%	Site-wide	10,000	320	Yes	31	HA-19	0	21	HA-9 through HA-19, HA-21 through HA-24, N-3

Notes
Only detected results are shown and all soil analytical results are reported in mg/kg.
Shading indicates the maximum concentration of the analyte exceeded its respective screening level.

Acronyms
-- = no data
NA = no available screening level
NV = no value
fbg = feet below grade
mg/kg = milligrams per kilogram
max = maximum
No. = number
SL = screening level
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
MTBE = methyl tert-butyl ether
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel

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Table 11. Groundwater Screening for Vapor Intrusion - Resident

Analyte	No. of Samples	Detection Rate	Location	Max	Residential SL	Max > SL?	Magnitude of Max	Location of Max	No. of Exceedances	Location of Exceedances
BTEX and Fuel Oxygenates										
Benzene	43	86%	On-site	6,200	27	Yes	230	MW-5	23	MW-4 through MW-8, V-2
			Off-site	1,600	27	Yes	59	MW-14	6	MW-13, MW-14
Ethylbenzene	43	81%	On-site	5,900	310	Yes	19	MW-5	7	MW-5, V-2
			Off-site	2,800	310	Yes	9	MW-14	4	MW-14
Toluene	43	56%	Site-wide	5,800	95,000	No	--	--	--	--
Total Xylenes	43	67%	Site-wide	31,000	37,000	No	--	--	--	--
DIPE	14	14%	Site-wide	16	NA	No	--	--	--	--
TPHs										
TPHg	40	100%	Site-wide	99,000	NV	--	--	--	--	--

Notes
Only detected results are shown and all groundwater analytical results are reported in ug/L.
Shading indicates the maximum concentration of the analyte exceeded its respective screening level.

Acronyms
-- = no data
NA = no available screening level
NV = no value
ug/L = micrograms per liter
max = maximum
No. = number
SL = screening level
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
DIPE = diisopropyl ether

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Table 12. Groundwater Screening for Vapor Intrusion - Commercial/Industrial Worker

Analyte	No. of Samples	Detection Rate	Location	Max	Commercial SL	Max > SL?	Magnitude of Max	Location of Max	No. of Exceedances	Location of Exceedances
BTEX and Fuel Oxygenates										
Benzene	43	86%	On-site	6,200	270	Yes	23	MW-5	16	MW-4 through MW-7, V-2
			Off-site	1,600	270	Yes	6	MW-14	6	MW-13, MW-14
Ethylbenzene	43	81%	On-site	5,900	3,100	Yes	2	MW-5	7	MW-5, V-2
			Off-site	2,800	3,100	No	--	--	--	--
Toluene	43	56%	Site-wide	5,800	Sample Soil Gas	No	--	--	--	--
Total Xylenes	43	67%	Site-wide	31,000	Sample Soil Gas	No	--	--	--	--
DIPE	14	14%	Site-wide	16	NA	No	--	--	--	--
TPHs										
TPHg	40	100%	Site-wide	99,000	NV	--	--	--	--	--

Notes
Only detected results are shown and all groundwater analytical results are reported in ug/L.
Shading indicates the maximum concentration of the analyte exceeded its respective screening level.

Acronyms
-- = no data
NA = no available screening level
NV = no value
ug/L = micrograms per liter
max = maximum
No. = number
SL = screening level
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
DIPE = diisopropyl ether

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Table 13. Soil Vapor Screening for Vapor Intrusion - Resident

Analyte	No. of Samples	Detection Rate	Location	Max	Resident SL	Max > SL?	Magnitude of Max	Location of Max	Depth of Max (fbg)	No. of Exceedances	Location of Exceedances
Benzene	15	40%	On-site	690,000	42	Yes	16,429	VP-14	5	5	VP-3, VP-14
			Off-site	770	42	Yes	18	VP-13	3	1	VP-13
Ethylbenzene	15	20%	On-site	94,000	490	Yes	192	VP-14	5	2	VP-14
			Off-site	ND	490	No	--	--	--	--	--
TPHg	15	100%	On-site	800,000,000	300,000	Yes	2,667	VP-3	5	6	VP-3, VP-14
			Off-site	540,000	300,000	Yes	2	VP-13	3	2	VP-13

Notes

Only detected results are shown and all soil vapor analytical results are reported in ug/m^3.
Shading indicates the maximum concentration of the analyte exceeded its respective screening level.

Acronyms

ND = not detected
-- = no data
fbg = feet below grade
ug/m^3 = micrograms per cubic meter
max = maximum
No. = number
SL = screening level
TPHg = total petroleum hydrocarbons as gasoline

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Table 14. Soil Vapor Screening for Vapor Intrusion - Commercial/Industrial Worker

Analyte	No. of Samples	Detection Rate	Location	Max	Commercial SL	Max > SL?	Magnitude of Max	Location of Max	Depth of Max (fbg)	No. of Exceedances	Location of Exceedances
Benzene	15	40%	On-site	690,000	420	Yes	1,643	VP-14	5	4	VP-14
			Off-site	770	420	Yes	2	VP-13	3	1	VP-13
Ethylbenzene	15	20%	On-site	94,000	4,900	Yes	19	VP-14	5	2	VP-14
			Off-site	ND	4,900	No	--	--	--	--	--
TPHg	15	100%	On-site	800,000,000	2,500,000	Yes	320	VP-3	5	6	VP-3, VP-14
			Off-site	540,000	2,500,000	No	--	--	--	--	--

Notes

Only detected results are shown and all soil vapor analytical results are reported in ug/m^3.
Shading indicates the maximum concentration of the analyte exceeded its respective screening level.

Acronyms

ND = not detected
-- = no data
fbg = feet below grade
ug/m^3 = micrograms per cubic meter
max = maximum
No. = number
SL = screening level
TPHg = total petroleum hydrocarbons as gasoline

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Table 15. Soil Vapor and Paired Groundwater Screening for Vapor Intrusion

Soil Vapor							Groundwater								
SV Probe ID	Date	Depth (fbg)	TPHg (ug/m^3)	Benzene (ug/m^3)	Toluene (ug/m^3)	Ethylbenzene (ug/m^3)	GW Well ID	Date	TPHg (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)	General GW Trend	Relationship to SV Probe
On-site	**Commercial SL**		**2,500,000**	**420**	**4,900**	**4,900**			**NV**	**270**	**3,100**	**3,100**	**Sample Soil Gas**		
VP-3-5	04/16/2015	5	**800,000,000**	<16,000	<19,000	<22,000	MW-4	5/22/2015	**7,100**	**1,500**	**48**	**54**	<40	2001-2015; Declining since 2001	Upgradient, within 7 feet
VP-3-3	08/27/2015	3	**41,000**	**50**	<19	**22**		--	--	--	--	--	--		
VP-3-5	08/27/2015	5	**270,000,000**	<16,000	<19,000	<22,000									
VP-14-3	04/16/2015	3	**290,000,000**	**240,000**	<19,000	<22,000	MW-6	5/22/2015	**1,600**	**360**	**39**	**60**	240	2006-2015; Declining, then stable since 2012	Crossgradient, within 7 feet
VP-14-5	04/16/2015	5	**270,000,000**	**690,000**	<19,000	**94,000**									
VP-14-3	08/27/2015	3	**250,000,000**	**190,000**	<24,000	<27,000		--	--	--	--	--	--		
VP-14-5	08/27/2015	5	**330,000,000**	**280,000**	<30,000	**48,000**									
Off-site	**Residential SL**		**300,000**	**42**	**490**	**490**			**NV**	**27**	**310**	**310**	**37,000**		
VP-12-3	04/16/2015	3	**81,000**	<16	<19	<22	MW-13	5/22/2015	**4,100**	**430**	**5.9**	**16**	<10	Installed 2015; Stable in 2015	Crossgradient, within 7 feet
VP-12-5	04/16/2015	5	**130,000**	<16	<19	<22									
VP-12-3	08/27/2015	3	**180,000**	<16	<19	<22		8/14/2015	**5,000**	**550**	<5.0	**8.5**	<10		
VP-12-5	08/27/2015	5	**210,000**	<16	<19	<22									
VP-13-3	04/16/2015	3	**320,000**	**770**	<190	<220	MW-14	5/22/2015	**5,200**	**320**	<10	**490**	--	2006-2015; Declining since 2006	Downgradient, within 30 feet
VP-13-5	04/16/2015	5	**35,000**	<16	<19	<22									
VP-13-3	08/27/2015	3	**540,000**	<16	<19	<22		--	--	--	<10	--	120		
VP-13-5	08/27/2015	5	**140,000**	<16	<19	<22									

Notes

All soil vapor concentrations are reported in ug/m^3.
All groundwater concentrations are reported in ug/L.
Bolding indicates the analyte was detected above the reporting limit.
Shading indicates the concentration of the analyte exceeded its respective screening level.

Acronyms

-- = no data
< = results are non-detect and shown at the reporting limit
fbg = feet below grade
GW = groundwater
ug/L = micrograms per liter
ug/m^3 = micrograms per cubic meter
SL = screening level
TPHg = total petroleum hydrocarbons as gasoline

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Table 16. Method Reporting Limit Screen - Soil 0-10 fbg

Analyte	No. of Samples	Detection Rate	Max MRL	Min SL	Max > MRL?
BTEX and Fuel Oxygenates					
Benzene	118	19%	10	0.74	Yes
Ethylbenzene	118	40%	2.5	4.8	No
Toluene	118	8%	10	1,000	No
Total Xylenes	118	36%	5	600	No
DIPE	1	0%	0.01	NA	NA
ETBE	1	0%	0.01	NA	NA
MTBE	22	9%	0.5	39	No
TAME	1	0%	0.01	NA	NA
TBA	11	0%	0.05	NV	NV
PAHs					
1-Methylnaphthalene	38	3%	0.33	NA	NA
2-Methylnaphthalene	43	2%	6.6	230	No
Acenaphthene	58	0%	6.6	3,400	No
Acenaphthylene	58	2%	6.6	NV	NV
Anthracene	58	7%	6.6	23,000	No
Benzo(a)Anthracene	58	19%	6.6	0.38	Yes
Benzo(a)Pyrene	58	22%	6.6	0.038	Yes
Benzo(b)Fluoranthene	58	24%	6.6	0.38	Yes
Benzo(g,h,i)Perylene	58	19%	6.6	NV	NV
Benzo(k)Fluoranthene	58	19%	6.6	0.38	Yes
Bis(2-ethylhexyl) phthalate	20	35%	6.6	160	No
Chrysene	58	21%	6.6	3.8	Yes
Dibenz(a,h)Anthracene	58	3%	8.4	0.11	Yes
Diethyl Phthalate	20	20%	6.6	49,000	No
Fluoranthene	58	22%	6.6	2,300	No
Fluorene	58	0%	6.6	3,100	No
Indeno(1,2,3-c,d)Pyrene	58	16%	6.6	0.38	Yes
Naphthalene	58	3%	6.6	3.1	Yes
Phenanthrene	58	16%	6.6	NV	NV
Pyrene	58	26%	6.6	3,400	No
TPHs					
TPHg	118	55%	50	770	No
TPHd	59	64%	10	240	No
TPHmo	59	53%	25	10,000	No

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Table 16. Method Reporting Limit Screen - Soil 0-10 fbg

Notes
All soil analytical results are reported in mg/kg.
The minimum screening level from Table 5 for soil was selected.
Only analytes with at least one non-detect is shown.

Acronyms
% = percent
-- = no data
mg/kg = milligrams per kilogram
max = maximum
min = minimum
NA = no screening level available
No. = number
NV = no value assigned
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
PAH = polycyclic aromatic hydrocarbons
DIPE = diisopropyl ether
ETBE = ethyl tert-butyl ether
MTBE = methyl tert-butyl ether
TAME = tert-amyl methyl ether
TBA = tert-Butyl alcohol
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
TPHmo = total petroleum hydrocarbons as motor oil

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Table 17. Method Reporting Limit Screen - Groundwater

Analyte	No. of Samples	Detection Rate	Max MRL	Min SL	Max > MRL?
BTEX and Fuel Oxygenates					
Benzene	43	86%	5	27	No
Ethylbenzene	43	81%	5	310	No
Toluene	43	56%	50	95,000	No
Total Xylenes	43	67%	40	37,000	No
DIPE	14	14%	50	NA	NA
ETBE	14	0%	50	NA	NA
MTBE	14	0%	50	9,900	No
TAME	14	0%	50	NA	NA
TBA	14	0%	1,000	NA	NA
TPHs					
TPHg	43	91%	50	NV	NV

Notes
All groundwater analytical results are reported in ug/L.
The minimum screening level used for groundwater was selected.
Only analytes with at least one non-detect is shown.

Acronyms
% = percent
-- = no data
ug/L = micrograms per liter
min = minimum
max = maximum
NA = no screening level available
No. = number
NV = no value assigned
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
TPH = total petroleum hydrocarbons
DIPE = diisopropyl ether
ETBE = ethyl tert-butyl ether
MTBE = methyl tert-butyl ether
TAME = tert-amyl methyl ether
TBA = tert-Butyl alcohol
TPHg = total petroleum hydrocarbons as gasoline

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Oakland, California

Table 18. Summary Statistics - Soil Vapor

Analyte	No. of Samples	Detection Rate	Max MRL	Min SL	Max > MRL?
Benzene	15	40%	16,000	42	Yes
Ethylbenzene	15	20%	27,000	490	No
Toluene	15	0%	30,000	160,000	No
Total Xylenes	15	0%	35,000	52,000	Yes
Naphthalene	15	0%	84,000	36	Yes

Notes

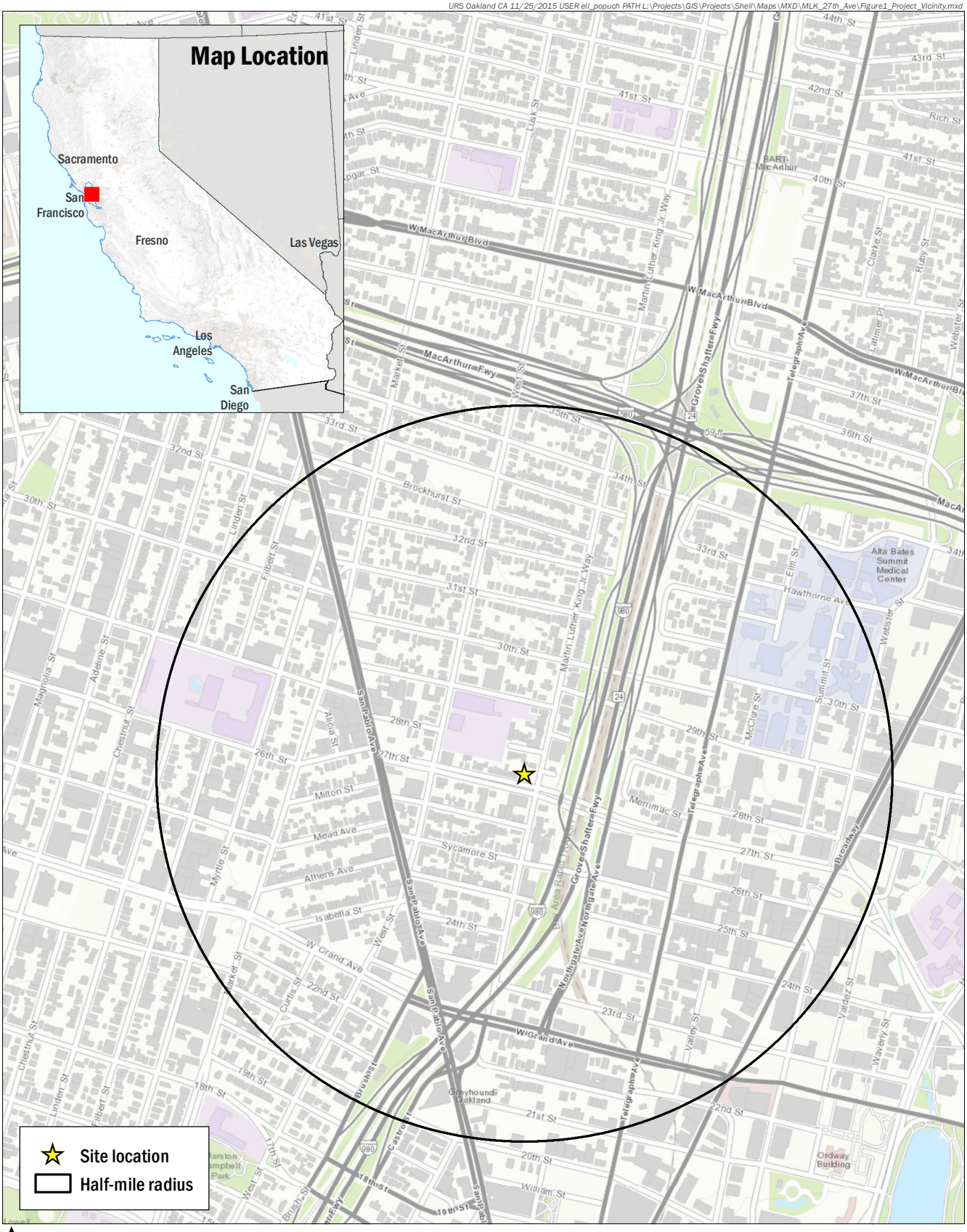
All soil vapor analytical results are reported in ug/m^3.
The minimum screening level used for soil vapor was selected.
Only analytes with at least one non-detect is shown.

Acronyms

% = percent
ug/m^3 = micrograms per cubic meter
min = minimum
max = maximum
No. = number

Figures

URS Oakland CA 11/25/2015 USER eli_popuch PATH L:\Projects\GIS\Projects\Shell\Maps\MXD\MLK_27th_Ave\Figure1_Project_Vicinity.mxd



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Shell

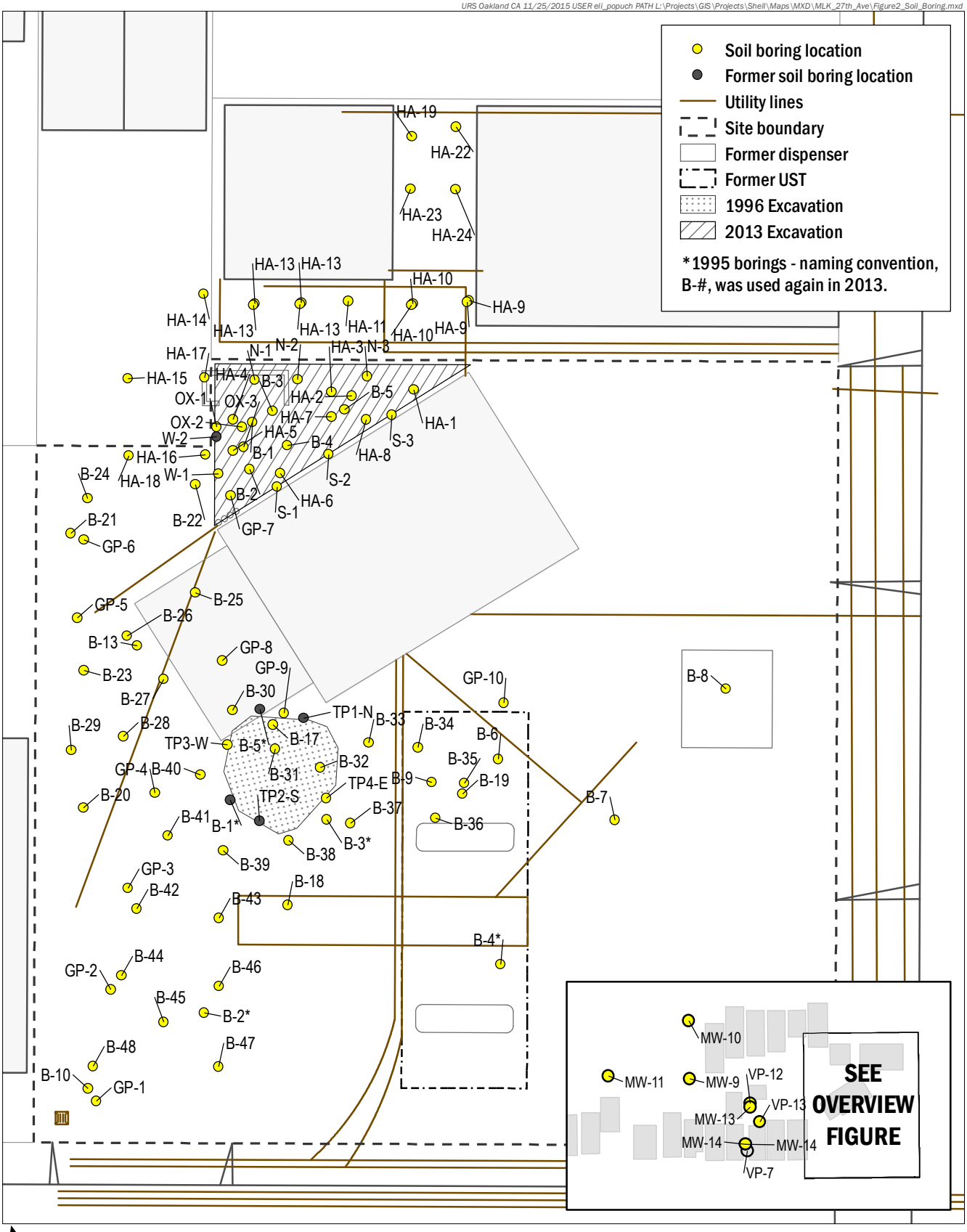
Former Shell Service Station

2703 MARTIN LUTHER KING JR. WAY

OAKLAND, CALIFORNIA

FIGURE 1

Vicinity Map



Source: GHD, 2015; AECOM, 2015

AECOM

Shell

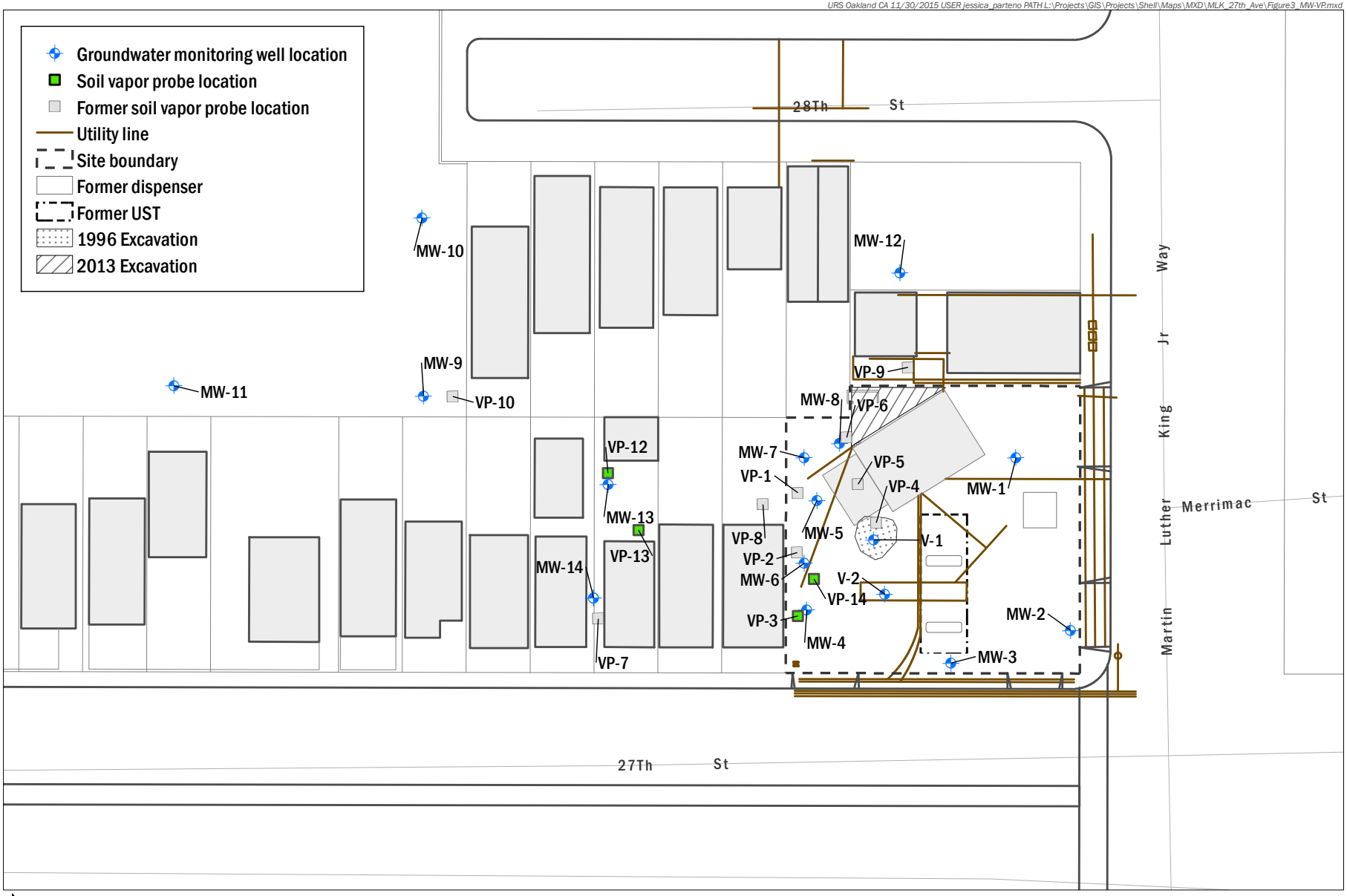
Former Shell Service Station

2703 MARTIN LUTHER KING JR. WAY
OAKLAND, CALIFORNIA

FIGURE 2

Soil Boring Locations

URS Oakland CA 11/30/2015 USER jessica_parteno PATH L:\Projects\GIS\Projects\Shell\Maps\MXD\MLK_27th_Ave\Figure3_MW-VP.mxd



Source:
GHD, 2015; AECOM, 2015

AECOM

Shell

Former Shell Service Station
2703 MARTIN LUTHER KING JR. WAY
OAKLAND, CALIFORNIA

FIGURE 3

Groundwater Monitoring and Soil Vapor Locations

Former Shell Service Station
2703 Martin Luther King Jr. Way
Oakland, California

Figure 4
Human Health Conceptual Site Model

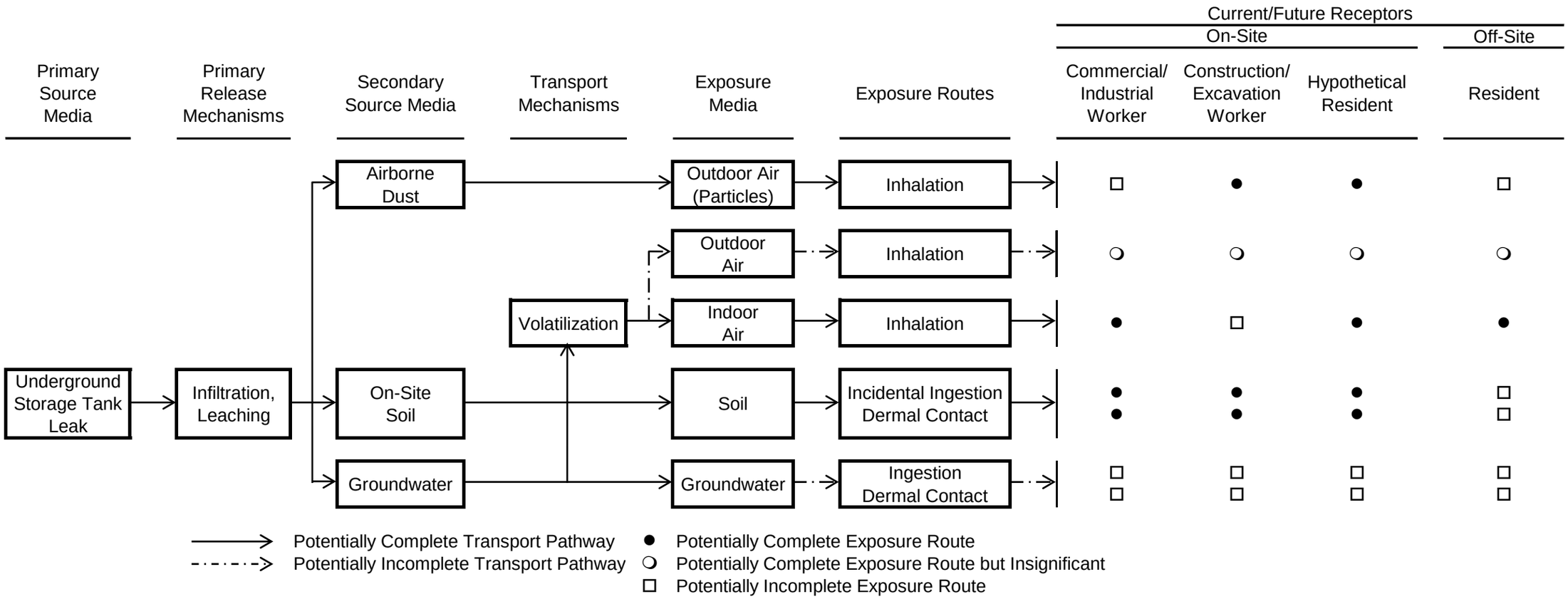


Figure 4. Human Health Conceptual Site Model

Appendix A.
Site History

Appendix A. Site History

A.1 Previous Work

A.1.1 1994 UST Removal

The 2,000-gallon UST was removed on October 11, 1994 by KTW & Associates on behalf of ATW. Two soil samples (TP-1-N and TP-2-S) were collected from beneath the tank. Chemical analysis of the soil samples identified the presence of total petroleum hydrocarbons as gasoline (TPHg) at concentrations ranging from 870 milligrams per kilogram (mg/kg) to 18,000 mg/kg. Benzene concentrations in these samples ranged from 2.9 to 100 mg/kg. The tank pit remained open until March 19, 1996 when the excavation was back-filled subsequent to over-excavation by a Shell contractor.

A.1.2 1995 Phase I Environmental Site Assessment (ESA)

In August and September 1995, Enviros Inc. (Enviros) performed a Phase I ESA for this site. Available information collected during this ESA indicates that the subject property was occupied by residential housing prior to approximately 1959. A building permit to erect a building was obtained for Shell Oil Company in February 1959. A building permit to "close lube bays with sheet metal panels" was secured for Shell Oil Company in July 1976.

In 1979, several building permits were secured for Acme to modify existing site structures. Two building permits were secured in 1979 related to the installation of a fuel pump at the Site. During a site survey in conjunction with the Phase I ESA, an excavation was observed near the southwest corner of the service building. The excavation was covered by a blue tarp. This excavation's location is consistent with that of the 2,000-gallon UST removed in 1994 by ATW, and with a large concrete slab observed in aerial photographs taken in 1971 and 1973, and a smaller concrete slab observed in aerial photographs taken in 1981 and 1985. The larger concrete slab observed in the aerial photographs was likely covering the USTs operated by Shell, and the smaller slab was likely covering the UST operated by Acme, confirming that the same location was used for both UST complexes.

A.1.3 1995 Subsurface Investigation

A site assessment was performed by ACC Environmental Consultants on May 23, 1995. This included drilling nine soil borings (B-1 through B-9) using a pneumatic sampling tool in the vicinity of the excavation (which formerly housed both Shell's and Acme's USTs) and the product dispenser islands, and collecting soil and groundwater samples for chemical analysis. TPHg concentrations in soil samples ranged from <20.0 to 830 mg/kg. Benzene concentrations ranged from <1.0 to 1.8 mg/kg. Separate phase hydrocarbons (SPH) were identified in water samples collected fi-om four of the soil borings (B-1, B-5, B-6, and B-9). TPHg concentrations in the non-SPH grab groundwater samples submitted for chemical analysis ranged from <50 to 89,000 micrograms per liter (µg/L). Benzene concentrations in the grab groundwater samples ranged from <0.5 to 21,000 µg/L.

A.1.4 1996 Over-Excavation

Over-excavation and back-filling of Acme's former UST excavation were performed on March 19, 1996. The excavation, originally left open to 9 fbg, was over- excavated to approximately 11 fbg. Two soil samples (TP-3-W and TP-4-E) were collected from the bottom of the over-excavated former UST area. Soil sample TP-3-W, collected from the western end of the excavation, contained 560 mg/kg TPHg, and 3.1 mg/kg benzene. Soil sample TP-4-E, collected from the eastern end of the excavation, contained 2,700 mg/kg TPHg and <3.0 mg/kg benzene. The excavation was back-filled with clean imported fill material. Soil sampling and back-filling activities are documented in Enviros' May 10, 1996 correspondence.

A.1.5 1996 Subsurface Investigation

In July 1996, Enviros performed additional site assessment activities. Six exploratory borings (B-10, B-11, B-12, B-13, V-1, and V-2) were drilled and sampled on July 17 and 19, 1996 using a hollow-stem auger drill rig.

Borings B-11 and B-12 were completed as groundwater monitoring wells MW-1 and MW-2, and borings V-1 and V-2 were completed as soil vapor extraction wells V-1 and V-2, respectively. Soil sampling was not performed in boring V-1 due to the fact that it was installed into the back-fill material within the former UST excavation. A soil sample from below the saturated zone in boring V-2 was submitted for physical parameter analyses (porosity, permeability, fractional organic carbon content, and dry bulk density).

TPHg and benzene were not detected in soil samples collected from MW-1 (B-11), MW-2 (B-12), and B-13. TPHg was detected in soil samples collected from B-10 and V-2 at concentrations of 1.7 and 110 mg/kg, respectively. Benzene concentrations in soil samples from B-10 and V-2 were <0.0050 and 0.29 mg/kg, respectively.

Grab groundwater samples were collected from borings B-10, B-12 (MW-2), and B-13 at the depth of first encountered groundwater (approximately 8 to 11 fbg) for chemical analysis. Boring B-11 (MW-1) did not yield sufficient groundwater for grab groundwater sample collection. Monitoring wells MW-1 and MW-2 were developed and sampled on August 2, 1999 by Blaine Tech Services (Blaine) of San Jose, CA. TPHg concentrations in the groundwater samples ranged from <50 to 290,000 µg/L. Benzene concentrations ranged from <0.50 to 34,000 µg/L.

A.1.6 1997 Modified Phase I ESA

In. February 1997, Enviros performed a modified Phase I ESA for the subject facility. A review of aerial photographs (1952 to 1994), ·city directories (1967 to 1993) and Sanborn maps (1912 to 1970) did not reveal evidence of an off-site source of petroleum hydrocarbons, which would have impacted groundwater on site. The properties located north and west of the subject facility appear to have been occupied by residential houses from at least 1912 to the present. The nearest gasoline stations identified in the vicinity of the subject facility were a former Chevron station (740 27th Street at West) approximately 450 feet to the west, a former station (26th Street and Martin Luther King, Jr. Way) approximately.300 feet to the south, and a former Mobil station (554 27th Street) approximately 950 feet to the east.

A.1.7 2000 Sensitive Receptor Survey

In late 2000, Cambria performed a sensitive receptor survey (SRS), which attempted to identify wells and underground utility conduits. Cambria obtained utility conduit maps from the City of Oakland Engineering Department to locate and map underground utility conduits, which may act as preferential pathways for contaminant migration from the Site. These conduit trenches are typically back-filled with materials that are more permeable than the surrounding native soils, therefore providing a path of least resistance for petroleum hydrocarbon migration within the local groundwater. Using these maps, Cambria identified the sanitary and storm sewer systems as the only utility conduits in the Site vicinity that may act as preferential pathways. All other utilities are typically buried at depths that are shallower than those of the sewer systems. Conduits identified in the area are located at depths of approximately 3.5 to 9 fbg. Therefore, the potential does exist for groundwater to flow within these conduit trenches. Groundwater depth on-site historically ranges from approximately 4.5 to 10 fbg. However, since the typical groundwater flow direction on site has generally been to the south, it is likely that any contaminant migration within the utility conduits would be limited, since the utility conduits located to the south of the Site are the shallowest of all the conduits identified adjacent to the Site at depths of 3.5 to 5.5 fbg. Cambria obtained well installation and destruction records from the California Department of Water Resources (DWR) in order to identify any active water producing wells in the vicinity of the Site, which may be at risk to petroleum hydrocarbon impact due to contaminant migration from the subsurface of the Site. DWR records did not identify any existing wells within a ½-mile radius of the Site.

A.1.8 2000 Subsurface Investigation

In November 2000, Cambria installed three soil borings (B-17, B-18 and B-19) and three groundwater monitoring wells (MW-3, MW-4 and MW-5). Up to 2,100 mg/kg TPHg and 3.3 mg/kg benzene were reported in soil samples collected. No TPHg or benzene was detected in soil samples collected from well MW-3. Except for 0.0070 mg/kg detected in soil sample B-18-7.0, no methyl tertiary butyl ether (MTBE) was detected in any of the analyzed soil samples. Tertiary butyl alcohol was detected in soil samples MW-4-5.0 and B-19-5.0 at concentrations of0.0079 and 0.0059 mg/kg, respectively.

Grab groundwater samples were collected from borings B-17 through B-19 at first encountered groundwater for analyses during the investigation. TPHg concentrations in grab water samples collected from the borings ranged from 58,000 to 190,000 µg/L. Benzene concentrations ranged from 4,400 to 13,000 µg/L. MTBE was detected in groundwater at concentrations of 16 and 300 µg/L from B-19 and B-17, respectively, and tertiary butyl alcohol was detected at 240 µg/L in B-19 only. No SPH was observed during the investigation.

A.1.9 2001 Oxygen Releasing Compound (ORC) Installation

As approved by the ACEH, Blaine installed ORCs in wells V-1 and V-2 during the second quarter monitoring event on May 2, 2001. ORCs were removed during the fourth quarter 2001 monitoring event. MTBE has not been detected in these two wells since the ORCs were installed.

A.1.10 2002 Site Investigation

In April 2002, Cambria installed borings B-20 through B-22. Groundwater was first encountered in the borings between 8.0 fbg (B-20) and 8.8 fbg (B-21 and B-22). The maximum TPHg and benzene concentrations detected in soil were 380 and 0.17 mg/kg, respectively, in the soil sample collected from 8.0 fbg in boring B-22, located behind the station building. No TPHg was detected in soil samples collected from boring B-21. No MTBE was detected in any of the analyzed soil samples collected from borings B-20, B-21, or B-22. Up to 160,000 µg/L TPHg and 18,000 µg/L benzene were reported in grab groundwater samples collected from borings B-20, B-21, and B-22. No MTBE was detected in grab groundwater samples collected from the borings. The complete report of findings was included in Cambria's June 21, 2002 Site Investigation Report. This document included recommendations for additional activities; however, a response from ACEH was never received.

A.1.11 2003 Door-to-Door Survey and Cross Sectional Diagram Preparation

During 2003, Cambria conducted a door-to-door survey of properties within 500 feet of the Site. No wells were identified, but seven structures with basements were identified and mapped. Additionally, two cross sectional diagrams were prepared for the Site. The complete report of findings is included in Cambria's December 16, 2003 Sensitive Receptor Survey, Geologic Cross Sections, and Fourth Quarter 2003 Groundwater Monitoring Report.

A.1.12 2003 - 2005 Oxygen Releasing Compound (ORC) Installation

Although agency approval was not received, Shell proactively installed ORC in wells MW-5 and V-2 during first quarter of 2003. The ORCs were replaced on a semi-annual basis. The use of ORC was discontinued during the first quarter 2005, at Shell's request.

A.1.13 May 2005 Agency Meeting

Since no agency response was received to the June 2002 Site Investigation Report that contained recommendations for additional investigation, and since monitoring continued to indicate elevated concentrations of volatile constituents in groundwater, Shell authorized Cambria to prepare a work plan to investigate subsurface soil, groundwater, and soil vapor conditions along the property boundaries and at select locations on site. A new case worker was assigned to this project in early 2005, and following a meeting with the new case worker, technical comments and work plan approval were received in ACEH correspondence dated June 6, 2005. On August 15, 2005, Cambria submitted correspondence providing responses to the technical comments, notification of field work, and a request for extension for the report of findings. In correspondence dated August 19, 2005, ACEH granted the extension.

A.1.14 2005 Soil Vapor Investigation

From August 28 through 31, 2005, Cambria installed ten soil borings (GP-1 through GP-10). In soil, TPHg was detected from borings GP-1 at 10.0 fbg, GP-2 at 4.5 fbg, GP-3 at 5.0 and 8.5 fbg, GP-6 at 9.5 fbg, and GP-7 at 9.5 fbg at concentrations ranging from 1.5 to 3,300 mg/kg and benzene was detected from borings GP-2 at 4.5 fbg, and GP-3 at 5.0 and 8.5 fbg at concentrations ranging from 0.027 to 15 mg/kg. In groundwater, TPHg was detected in all four borings (GP-1, GP-3, GP-6, and GP-7) at concentrations ranging from.9,100 to 140,000 µg/L and benzene was also detected in all four groundwater samples at concentrations ranging from 320 to 17,000 µg/L. Soil vapor samples were collected from each boring and TPHg was detected in GP-1 through GP-10 at concentrations ranging from 350 to 71,000,000 micrograms per cubic meter (µg/m^3). Benzene was detected in

soil samples collected from borings GP-1 through GP-3 and GP-5 through GP-10 at concentrations ranging from <4.1 to 170,000 µg/m^3. A complete discussion and presentation of these activities and findings is included in Cambria's November 15, 2005 Site Investigation Report. This report also included. recommendations for performing a door-to-door survey within 300 feet of the Site to confirm basement locations, building construction, and potential sources; preparing work plans for pilot testing and plume delineation. Cambria submitted the November 22, 2005 Feasibility Study Work Plan and the December 16, 2005 Plume Delineation Work Plan, which Alameda County Environmental Health (ACEH) staff approved in their December 29, 2005 correspondence.

A.1.15 December 2005 - Door-to-Door Survey

Cambria conducted a door-to-door survey within 300-feet of the subject site for wells, basements, and foundation type to identify building construction and potential vapor receptors. Questionnaires were sent to 110 properties and responses for 25 properties were received as of January 13, 2006. Tabulated data and a list of properties included in the survey, and which completed surveys were received was included in our Door to Door Survey Report, Access Agreement Update, and Status/Schedule Update submittal dated January 15, 2006. Of the 25 responses received, none of the properties had basements. Three properties were denoted as vacant; nine properties contained buildings constructed with slab-on-grade foundations; three contained buildings constructed with perimeter foundations. Responses for the other 10 properties were either left blank, marked as unknown, or the response was contradictory or unclear. Regarding underground storage tanks, 17 responses were negative, four responses were marked as "unknown", and four responses were left blank. With the exception of the monitoring wells at the subject site, no wells were identified through the survey activities.

A.1.16 January 2006- Subsurface Investigation

On January 3 and 4, 2006, Cambria advanced three monitoring wells (MW-6 through MW-8), one soil boring (B-23), and six soil vapor probes (VP-1 through VP-6). In soil, TPHg was detected from borings MW-6 at 10.0 and 15.5 fbg, MW-7 at 11.5 and 16.5 fbg, MW-8 at 10.5 and 19 fbg, and B-23 at 10, 15.5, and 19.5 fbg at concentrations ranging from 7.1 to 3,800 mg/kg. Benzene was detected from borings MW-6 at 19.5 fbg, MW-8 at 19.5 fbg, and B-23 at 15.5 and 19.5 fbg at concentrations ranging from 0.0090 to 33 mg/kg. The vapor probes were not installed due to saturated soil conditions. A complete discussion and presentation of these activities and findings is included in Cambria's April 14, 2006 Site Investigation Report, and First Quarter 2006-Groundwater Monitoring Report.

A.1.17 January 2006- DPE Pilot Test

Cambria conducted a five-day dual phase extraction pilot test the week of January 16, 2006. The details and results were presented in Cambria's Pilot Test Report dated March 14, 2006. DPE was performed on wells V-1, V-2, MW-6, MW-7, MW-4, MW-5, and MW-8. On January 20, 2006, a constant vacuum DPE test was conducted on well MW-6. The report concluded 1) the absence of vapor phase concentrations (and groundwater concentrations) from well V-1 indicates that the former UST excavation does not contain residual source material; 2) high sustained and increasing vapor concentrations suggest source material is present in the vicinity of wells V-2, MW-5, and MW-8; 3) variability in extraction flow rates across the Site may reflect heterogeneities in subsurface soils or may suggest preferential pathways; and 4) the extremely high effective radius of influence calculated for wells MW-5 and MW-8 during DPE testing on well MW-7 supports the presence of a preferential pathway in the vicinity of these wells. The data from the DPE pilot test suggests that DPE is feasible at this site. The groundwater table was effectively drawn down by DPE and moderate vapor extraction flow rates were yielded from some of the extraction points. Although DPE is deemed feasible, Cambria did not recommend implementing DPE at this site. The extraction points that yielded the highest vapor concentrations did not yield an effective vapor extraction flow rate. Conversely, low vapor concentrations were yielded from the extraction point that did yield an effective vapor extraction flow rate. Therefore, DPE is not considered feasible in the target areas at this site.

A.1.18 February 2006- Install Off-site Wells MW-12 and MW-14

The December 20, 2005 Plume Delineation Work Plan proposed off-site activities including the installation of seven off-site monitoring wells and eight soil vapor probes. Based on responses from only two of the off-site property owners, Cambria completed a portion of the· scope of work recommended. Monitoring wells MW-12 and MW-14 were installed at two off-site properties to 20 and 14.5 fbg, respectively. Groundwater was first

encountered during drilling activities in borings MW-12 and MW-14 at 14.0 and 11.0 fbg, respectively. None of the soil samples from well MW-12 indicated the presence of any TPHg or BTEX. The 5-fbg sample from MW-14 also did not contain any reportable concentrations. TPHg was reported in the 10 and 14 fbg samples from MW-14 at concentrations of 32 and 970 mg/kg, respectively. Benzene was reported in the same two samples at concentrations of0.0083 and 2.3 mg/kg, respectively. Fuel oxygenates were requested on the 10 fbg and 14 fbg soil samples from MW-14, and none were reported above the detection limits. These activities are documented in Cambria's May 25, 2006 Subsurface Investigation Report.

A.1.19 April 2006 - Survey and Site Visit

In addition to surveying the new wells, Cambria identified historical boring locations from patches on the ground surface, historical excavation edges, trenches, and other site features, and requested that they be included in the survey. Report figures since May 2006 have included the new survey data. Also, during the Site visit, an inspection inside the building identified two bathrooms. A floor drain was observed in the northern-most bathroom. Standing liquid was present in the floor drain and automotive parts and cleaners were stored in this area. Thus, a sample from the floor drain was collected and submitted for analyses of volatile organic compounds (VOCs) by EPA Method 8260 and semi-volatile organic compounds (SVOCs) by EPA Method 8270. The floor drain sample was analyzed for VOCs and SVOCs. The results indicated the presence of carbon disulfide (3.69 µg/L), ethylbenzene (0.610 µg/L) and toluene (0.770 µg/L). This information was reported in Cambria's May 25, 2006 Subsurface Investigation Report.

A.1.20 May 2006- Geophysical Survey

As recommended in Cambria's May 25, 2006 Subsurface Investigation Report, a geophysical study was performed on May 22, 2006. The objectives of this effort were to detem1ine whether or not a waste oil UST was in the ground in the northwest portion of the property, and to evaluate the presence of subsurface utilities in this area that may act as preferential pathways, including the mapping of the sewer line from the floor drain found inside the northwest comer of the building during the April 19, 2006 site inspection. The results did not identify the presence of a UST on the northwest comer of the Site, but did find another vent line located behind the northeast comer of the station building. A subsurface electric line was traced from the station building to the western property boundary, and an unidentified subsurface utility was traced from the northwest comer of the station building to the southwest, near MW-5 and toward MW-6. The presence of the unknown utility line in the northwest comer confirms the observations of a possible preferential pathway in this area based on the dual-phase extraction pilot test performed in January 2006. NORCAL was unable to run a line down the floor drain inside of the building due to the trap in the line, so the sewer cleanout was found on the exterior of the building. Accessing the cleanout would have resulted in damage to the cap, and the property owner would not grant permission for Cambria to open the cleanout and repair any damage. Thus, the location, direction, and depth of the sewer line in this area are still unknown. However, based on the GPR survey that was performed to try to locate a non-metallic sewer line, NORCAL concludes that the sewer line may be more than 4 fbg, since the GPR was unable to identify the line. This information was presented in Cambria's July 25, 2006 Status Update, Report of Geophysical Survey, and Request for Agency Meeting.

A.1.21 August 2006 - Agency Meeting

On August 2, 2006, a meeting between Shell and the ACEH was held to discuss results of recent activities, the status of pending activities, and an agreed upon course for proposed additional activities. During that meeting, the parties agreed to a scope of work, which was presented in Cambria's August 31, 2006 Subsurface Investigation Work Plan. The objectives detailed in that work plan were to:

- Obtain detailed lithologic information on site and off site by continuous sampling using electronic logging by cone penetration testing (CPT) technique in five on-site and five off-site borings labeled CPT-1 through CPT-10;
- Collect shallow soil vapor samples from approximately 5 feet below grade (fbg) near off-site monitoring well MW-14 (CPT-8);
- Obtain groundwater samples from first encountered groundwater from areas where wells have not been installed (CPT-5 through CPT-7, CPT-9, and CPT-10);

- Collect groundwater from deeper within the first aquifer at all locations from approximately 20-25 fbg, depending on the CPT log results;
- Collect groundwater samples from a deeper interval at select locations for vertical groundwater profiling (CPT-4, CPT-6, CPT-8, and CPT-9);
- Install the on-site vapor probes to allow for the future collection of soil vapor samples near the western property boundary;
- Collect ambient air samples near the basement area at 664 27th Street for chemical analysis.

This scope of work was approved by the ACEH in correspondence dated September 5, 2006.

A.1.22 October 2006- CPT-1 through CPT-5 and VP-1 through VP-6

Cambria installed CPT-1 through CPT-5 and VP-1 through VP-6 on the subject site. Off-site borings were not successful due to concerns about property damage (CPT-8 and CPT-9), and utility conflicts (CPT-6 and CPT-7), and lack of access agreement (CPT-10). There was a lack of adequate groundwater recharge for many of the groundwater samples attempted between 15 and 29 fbg. Groundwater sample results from between 31-37 .fbg confirm significant attenuation of contaminants of at least one order of magnitude from the interval monitored by the Site wells (5-20 fbg), thus nor further vertical delineation is warranted. Comparison of data from 1995, 2000, and 2006 in similar location (B-6 & B-9, B-19, and CPT-5, respectively) demonstrates attenuation of contaminant concentrations over time is occurring. The six on-site vapor probes could not be sampled due to the presence of water in some of the probes. A site inspection at the neighboring property was performed and revealed that due to significant ventilation and air exchange with outdoor ambient air, vapor sampling within the above-ground basement was no longer warranted. These activities are documented in Cambria's January 31, 2007 CPT Investigation and Vapor Probe Installation Report.

A.1.23 May and June 2007 CPT-6, CPT-7, and CPT-10 and VP-7 and VP-8

CRA drilled off-site borings CPT-6, CPT-7, and CPT-10 and installed off-site vapor probe pairs VP-7 and VP-8. No TPHg or benzene were detected in soil samples collected from VP-7 and VP-8, or from boring CPT-6. There was a lack of adequate groundwater recharge in the shallow groundwater sampling interval in boring CPT-6, and in both the shallow and deeper attempted intervals in boring CPT-7. Grab groundwater samples from boring CPT-10 contained 38,000 ug /L TPHg and 1,600 µg/L benzene at 13-17 fbg, and 640 µg/L TPHg and 3.8 µg/L benzene at 20-23 fbg. Soil vapor samples collected from both sampling intervals (approximately 2.5 and 4.5 fbg) in probes VP-7 and VP-8 did not contain TPHg or benzene concentrations above the residential ESLs. These activities are documented in CRA's August 27,2007 Plume Delineation and Soil Vapor Sampling Report.

A.1.24 June 2015 – Subsurface Investigation Report

The purpose of the investigation was to further assess soil, groundwater, and soil vapor conditions on site and down gradient from the Site. One off-site groundwater monitoring well (MW-13), two nested off-site soil vapor probes (VP-12 and VP-13), and one on-site nested soil vapor probe (VP-14) were installed and sampled. On-site soil vapor probe VP-3 at 5 fbg was also sampled. One well and two soil vapor probes proposed in CRA's July 19, 2012 work plan were not installed because the off-site property owners would not allow access. One off-site probe (VP-13) was moved to an adjacent property. On-site soil vapor probes VP-2 at 3 and 5 fbg and VP-3 at 3 fbg could not be sampled due to water in the probes.

All TPHg and BTEX concentrations in soil samples collected from the well boring were below RWQCB ESLs. As requested, CRA collected surface soil samples from each of the soil vapor probe locations and the well boring for lead analyses. All lead concentrations were below the RWQCB ESL. COC concentrations in soil vapor samples exceeded the RWQCB ESLs in VP-3 at 5 fbg, VP-13 at 3 fbg, and VP-14 at 3 and 5 fbg. MW-13 was added to the groundwater monitoring program for this site, and the well will be monitored quarterly for at least one hydrologic cycle (one year).

A.1.25 October 2015 – Soil Vapor Sampling Report

GHD sampled on-Site soil vapor probes VP-3 and VP-14 and off-Site soil vapor probes VP-12 and VP-13 at 3 and 5 fbg. On-Site soil vapor probe VP-2 at 3 and 5 fbg could not be sampled because the location was inaccessible, and off-site soil vapor probe VP-7 was not sampled due to an administrative error. TPHg soil vapor sample concentrations in VP-3 at 5 fbg and VP-14 at 3 and 5 fbg exceeded RWQCB ESLs for residential and commercial land use in the April 16, 2015 and August 27, 2015 sampling events. Benzene concentrations in VP-14 at 3 and 5 fbg and ethylbenzene in VP-14 at 5 fbg also exceeded RWQCB ESLs for residential and commercial land use in both sampling events.

A.1.26 1996 to Present - Ongoing Groundwater Monitoring

Quarterly groundwater monitoring has been ongoing at the Site since August 1996 and currently includes on-site monitoring wells MW-1 through MW-8, VP-1, and VP-2, and off-site monitoring wells MW-12 and MW-14. Fuel oxygenates are not a significant component of the groundwater plumes, although some detections of di-isopropyl ether and tertiary butyl alcohol have been observed. Overall, the groundwater flow direction is primarily to the west, with some radial components on site to the northwest and southwest. Historically, monitoring wells MW-1, MW-2, MW-3, and MW-12 have shown little or no impact from petroleum hydrocarbons. Maximum historical concentrations of TPHg and benzene have been observed in on-site monitoring well MW-5.

Appendix B.
Risk Assessment Data

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-1	5	4/8/2009	1-Methylnaphthalene	<0.020
HA-10	1	12/13/2010	1-Methylnaphthalene	<0.020
HA-10	4.5	12/13/2010	1-Methylnaphthalene	<0.020
HA-11	1	12/13/2010	1-Methylnaphthalene	<0.020
HA-11	4.5	12/13/2010	1-Methylnaphthalene	<0.020
HA-12	1	12/13/2010	1-Methylnaphthalene	<0.020
HA-12	4.5	12/13/2010	1-Methylnaphthalene	<0.020
HA-13	1	12/13/2010	1-Methylnaphthalene	<0.020
HA-13	4.5	12/13/2010	1-Methylnaphthalene	<0.020
HA-2	5	4/8/2009	1-Methylnaphthalene	<0.020
HA-3	5	4/8/2009	1-Methylnaphthalene	<0.020
HA-4	5	4/8/2009	1-Methylnaphthalene	<0.020
HA-5	5	4/8/2009	1-Methylnaphthalene	<0.020
HA-6	5	4/8/2009	1-Methylnaphthalene	<0.020
HA-7	5	4/8/2009	1-Methylnaphthalene	<0.020
HA-8	5	4/8/2009	1-Methylnaphthalene	<0.020
HA-9	1	12/13/2010	1-Methylnaphthalene	<0.020
HA-9	4.5	12/13/2010	1-Methylnaphthalene	<0.020
HA-12	0	12/13/2010	1-Methylnaphthalene	0.029
B-2	2	1/22/2013	1-Methylnaphthalene	<0.076
B-3	2	1/22/2013	1-Methylnaphthalene	<0.076
N-2	2	1/22/2013	1-Methylnaphthalene	<0.076
S-1	2	1/22/2013	1-Methylnaphthalene	<0.076
S-2	2	1/22/2013	1-Methylnaphthalene	<0.076
S-3	2	1/22/2013	1-Methylnaphthalene	<0.076
HA-10	0	12/13/2010	1-Methylnaphthalene	<0.10
HA-11	0	12/13/2010	1-Methylnaphthalene	<0.10
HA-13	0	12/13/2010	1-Methylnaphthalene	<0.10
HA-9	0	12/13/2010	1-Methylnaphthalene	<0.10
B-4	2	1/22/2013	1-Methylnaphthalene	<0.15
B-5	2	1/22/2013	1-Methylnaphthalene	<0.15
N-3	2	1/22/2013	1-Methylnaphthalene	<0.15
W-1	2	1/22/2013	1-Methylnaphthalene	<0.15
OX-2	3	2/21/2013	1-Methylnaphthalene	<0.17
OX-3	3	2/21/2013	1-Methylnaphthalene	<0.17
B-1	2	1/22/2013	1-Methylnaphthalene	<0.30
N-1	2	1/22/2013	1-Methylnaphthalene	<0.30
OX-1	3	2/21/2013	1-Methylnaphthalene	<0.33
HA-1	5	4/8/2009	2-Methylnaphthalene	<0.020
HA-10	1	12/13/2010	2-Methylnaphthalene	<0.020
HA-10	4.5	12/13/2010	2-Methylnaphthalene	<0.020
HA-11	1	12/13/2010	2-Methylnaphthalene	<0.020
HA-11	4.5	12/13/2010	2-Methylnaphthalene	<0.020
HA-12	1	12/13/2010	2-Methylnaphthalene	<0.020
HA-12	4.5	12/13/2010	2-Methylnaphthalene	<0.020
HA-13	1	12/13/2010	2-Methylnaphthalene	<0.020
HA-13	4.5	12/13/2010	2-Methylnaphthalene	<0.020
HA-2	5	4/8/2009	2-Methylnaphthalene	<0.020
HA-3	5	4/8/2009	2-Methylnaphthalene	<0.020

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-4	5	4/8/2009	2-Methylnaphthalene	<0.020
HA-5	5	4/8/2009	2-Methylnaphthalene	<0.020
HA-6	5	4/8/2009	2-Methylnaphthalene	<0.020
HA-7	5	4/8/2009	2-Methylnaphthalene	<0.020
HA-8	5	4/8/2009	2-Methylnaphthalene	<0.020
HA-9	1	12/13/2010	2-Methylnaphthalene	<0.020
HA-9	4.5	12/13/2010	2-Methylnaphthalene	<0.020
HA-12	0	12/13/2010	2-Methylnaphthalene	0.042
B-2	2	1/22/2013	2-Methylnaphthalene	<0.079
B-3	2	1/22/2013	2-Methylnaphthalene	<0.079
N-2	2	1/22/2013	2-Methylnaphthalene	<0.079
S-2	2	1/22/2013	2-Methylnaphthalene	<0.079
S-3	2	1/22/2013	2-Methylnaphthalene	<0.079
S-1	2	1/22/2013	2-Methylnaphthalene	<0.080
HA-10	0	12/13/2010	2-Methylnaphthalene	<0.10
HA-11	0	12/13/2010	2-Methylnaphthalene	<0.10
HA-13	0	12/13/2010	2-Methylnaphthalene	<0.10
HA-9	0	12/13/2010	2-Methylnaphthalene	<0.10
B-4	2	1/22/2013	2-Methylnaphthalene	<0.16
B-5	2	1/22/2013	2-Methylnaphthalene	<0.16
N-3	2	1/22/2013	2-Methylnaphthalene	<0.16
W-1	2	1/22/2013	2-Methylnaphthalene	<0.16
OX-2	3	2/21/2013	2-Methylnaphthalene	<0.17
OX-3	3	2/21/2013	2-Methylnaphthalene	<0.17
B-1	2	1/22/2013	2-Methylnaphthalene	<0.32
N-1	2	1/22/2013	2-Methylnaphthalene	<0.32
OX-1	3	2/21/2013	2-Methylnaphthalene	<0.33
HA-10	0	4/22/2013	2-Methylnaphthalene	<0.66
HA-10	1	4/22/2013	2-Methylnaphthalene	<0.66
HA-9	0	4/22/2013	2-Methylnaphthalene	<1.3
HA-12	0	4/22/2013	2-Methylnaphthalene	<3.3
HA-13	0	4/22/2013	2-Methylnaphthalene	<6.6
HA-1	5	4/8/2009	Acenaphthene	<0.020
HA-10	1	12/13/2010	Acenaphthene	<0.020
HA-10	4.5	12/13/2010	Acenaphthene	<0.020
HA-11	1	12/13/2010	Acenaphthene	<0.020
HA-11	4.5	12/13/2010	Acenaphthene	<0.020
HA-12	0	12/13/2010	Acenaphthene	<0.020
HA-12	1	12/13/2010	Acenaphthene	<0.020
HA-12	4.5	12/13/2010	Acenaphthene	<0.020
HA-13	1	12/13/2010	Acenaphthene	<0.020
HA-13	4.5	12/13/2010	Acenaphthene	<0.020
HA-2	5	4/8/2009	Acenaphthene	<0.020
HA-3	5	4/8/2009	Acenaphthene	<0.020
HA-4	5	4/8/2009	Acenaphthene	<0.020
HA-5	5	4/8/2009	Acenaphthene	<0.020
HA-6	5	4/8/2009	Acenaphthene	<0.020
HA-7	5	4/8/2009	Acenaphthene	<0.020
HA-8	5	4/8/2009	Acenaphthene	<0.020

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-9	1	12/13/2010	Acenaphthene	<0.020
HA-9	4.5	12/13/2010	Acenaphthene	<0.020
HA-14	1	4/18/2012	Acenaphthene	<0.030
HA-14	4.5	4/18/2012	Acenaphthene	<0.030
HA-15	4.5	4/18/2012	Acenaphthene	<0.030
HA-17	1	4/18/2012	Acenaphthene	<0.030
HA-17	4.5	4/18/2012	Acenaphthene	<0.030
HA-18	4.5	4/18/2012	Acenaphthene	<0.030
HA-15	1	4/18/2012	Acenaphthene	<0.045
HA-16	1	4/18/2012	Acenaphthene	<0.045
HA-16	4.5	4/18/2012	Acenaphthene	<0.045
HA-18	1	4/18/2012	Acenaphthene	<0.045
B-2	2	1/22/2013	Acenaphthene	<0.073
B-3	2	1/22/2013	Acenaphthene	<0.073
N-2	2	1/22/2013	Acenaphthene	<0.073
S-1	2	1/22/2013	Acenaphthene	<0.073
S-2	2	1/22/2013	Acenaphthene	<0.073
S-3	2	1/22/2013	Acenaphthene	<0.073
HA-10	0	12/13/2010	Acenaphthene	<0.10
HA-11	0	12/13/2010	Acenaphthene	<0.10
HA-13	0	12/13/2010	Acenaphthene	<0.10
HA-9	0	12/13/2010	Acenaphthene	<0.10
B-4	2	1/22/2013	Acenaphthene	<0.15
B-5	2	1/22/2013	Acenaphthene	<0.15
N-3	2	1/22/2013	Acenaphthene	<0.15
W-1	2	1/22/2013	Acenaphthene	<0.15
OX-2	3	2/21/2013	Acenaphthene	<0.17
OX-3	3	2/21/2013	Acenaphthene	<0.17
HA-14	0	4/18/2012	Acenaphthene	<0.18
HA-16	0	4/18/2012	Acenaphthene	<0.18
B-1	2	1/22/2013	Acenaphthene	<0.29
N-1	2	1/22/2013	Acenaphthene	<0.29
OX-1	3	2/21/2013	Acenaphthene	<0.33
HA-15	0	4/18/2012	Acenaphthene	<0.45
HA-17	0	4/18/2012	Acenaphthene	<0.45
HA-18	0	4/18/2012	Acenaphthene	<0.45
HA-10	0	4/22/2013	Acenaphthene	<0.66
HA-10	1	4/22/2013	Acenaphthene	<0.66
HA-9	0	4/22/2013	Acenaphthene	<1.3
HA-12	0	4/22/2013	Acenaphthene	<3.3
HA-13	0	4/22/2013	Acenaphthene	<6.6
HA-1	5	4/8/2009	Acenaphthylene	<0.020
HA-10	1	12/13/2010	Acenaphthylene	<0.020
HA-10	4.5	12/13/2010	Acenaphthylene	<0.020
HA-11	1	12/13/2010	Acenaphthylene	<0.020
HA-11	4.5	12/13/2010	Acenaphthylene	<0.020
HA-12	1	12/13/2010	Acenaphthylene	<0.020
HA-12	4.5	12/13/2010	Acenaphthylene	<0.020
HA-13	1	12/13/2010	Acenaphthylene	<0.020

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-13	4.5	12/13/2010	Acenaphthylene	<0.020
HA-2	5	4/8/2009	Acenaphthylene	<0.020
HA-3	5	4/8/2009	Acenaphthylene	<0.020
HA-4	5	4/8/2009	Acenaphthylene	<0.020
HA-5	5	4/8/2009	Acenaphthylene	<0.020
HA-6	5	4/8/2009	Acenaphthylene	<0.020
HA-7	5	4/8/2009	Acenaphthylene	<0.020
HA-8	5	4/8/2009	Acenaphthylene	<0.020
HA-9	1	12/13/2010	Acenaphthylene	<0.020
HA-9	4.5	12/13/2010	Acenaphthylene	<0.020
HA-14	1	4/18/2012	Acenaphthylene	<0.030
HA-14	4.5	4/18/2012	Acenaphthylene	<0.030
HA-15	4.5	4/18/2012	Acenaphthylene	<0.030
HA-17	1	4/18/2012	Acenaphthylene	<0.030
HA-17	4.5	4/18/2012	Acenaphthylene	<0.030
HA-18	4.5	4/18/2012	Acenaphthylene	<0.030
HA-15	1	4/18/2012	Acenaphthylene	<0.045
HA-16	1	4/18/2012	Acenaphthylene	<0.045
HA-16	4.5	4/18/2012	Acenaphthylene	<0.045
HA-18	1	4/18/2012	Acenaphthylene	<0.045
HA-12	0	12/13/2010	Acenaphthylene	0.048
B-2	2	1/22/2013	Acenaphthylene	<0.078
B-3	2	1/22/2013	Acenaphthylene	<0.078
N-2	2	1/22/2013	Acenaphthylene	<0.078
S-1	2	1/22/2013	Acenaphthylene	<0.078
S-2	2	1/22/2013	Acenaphthylene	<0.078
S-3	2	1/22/2013	Acenaphthylene	<0.078
HA-10	0	12/13/2010	Acenaphthylene	<0.10
HA-11	0	12/13/2010	Acenaphthylene	<0.10
HA-13	0	12/13/2010	Acenaphthylene	<0.10
HA-9	0	12/13/2010	Acenaphthylene	<0.10
B-4	2	1/22/2013	Acenaphthylene	<0.15
B-5	2	1/22/2013	Acenaphthylene	<0.16
N-3	2	1/22/2013	Acenaphthylene	<0.16
W-1	2	1/22/2013	Acenaphthylene	<0.16
OX-2	3	2/21/2013	Acenaphthylene	<0.17
OX-3	3	2/21/2013	Acenaphthylene	<0.17
HA-14	0	4/18/2012	Acenaphthylene	<0.18
HA-16	0	4/18/2012	Acenaphthylene	<0.18
B-1	2	1/22/2013	Acenaphthylene	<0.31
N-1	2	1/22/2013	Acenaphthylene	<0.31
OX-1	3	2/21/2013	Acenaphthylene	<0.33
HA-15	0	4/18/2012	Acenaphthylene	<0.45
HA-17	0	4/18/2012	Acenaphthylene	<0.45
HA-18	0	4/18/2012	Acenaphthylene	<0.45
HA-10	0	4/22/2013	Acenaphthylene	<0.66
HA-10	1	4/22/2013	Acenaphthylene	<0.66
HA-9	0	4/22/2013	Acenaphthylene	<1.3
HA-12	0	4/22/2013	Acenaphthylene	<3.3

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Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-13	0	4/22/2013	Acenaphthylene	<6.6
HA-1	5	4/8/2009	Anthracene	<0.020
HA-10	4.5	12/13/2010	Anthracene	<0.020
HA-11	1	12/13/2010	Anthracene	<0.020
HA-11	4.5	12/13/2010	Anthracene	<0.020
HA-12	4.5	12/13/2010	Anthracene	<0.020
HA-13	1	12/13/2010	Anthracene	<0.020
HA-13	4.5	12/13/2010	Anthracene	<0.020
HA-2	5	4/8/2009	Anthracene	<0.020
HA-3	5	4/8/2009	Anthracene	<0.020
HA-4	5	4/8/2009	Anthracene	<0.020
HA-5	5	4/8/2009	Anthracene	<0.020
HA-6	5	4/8/2009	Anthracene	<0.020
HA-7	5	4/8/2009	Anthracene	<0.020
HA-8	5	4/8/2009	Anthracene	<0.020
HA-9	4.5	12/13/2010	Anthracene	<0.020
HA-12	1	12/13/2010	Anthracene	0.026
HA-9	1	12/13/2010	Anthracene	0.027
HA-10	1	12/13/2010	Anthracene	0.03
HA-14	1	4/18/2012	Anthracene	<0.030
HA-14	4.5	4/18/2012	Anthracene	<0.030
HA-15	4.5	4/18/2012	Anthracene	<0.030
HA-17	1	4/18/2012	Anthracene	<0.030
HA-17	4.5	4/18/2012	Anthracene	<0.030
HA-18	4.5	4/18/2012	Anthracene	<0.030
HA-15	1	4/18/2012	Anthracene	<0.045
HA-16	1	4/18/2012	Anthracene	<0.045
HA-16	4.5	4/18/2012	Anthracene	<0.045
HA-18	1	4/18/2012	Anthracene	<0.045
B-2	2	1/22/2013	Anthracene	<0.053
B-3	2	1/22/2013	Anthracene	<0.053
N-2	2	1/22/2013	Anthracene	<0.053
S-2	2	1/22/2013	Anthracene	<0.053
S-3	2	1/22/2013	Anthracene	<0.053
S-1	2	1/22/2013	Anthracene	<0.054
HA-12	0	12/13/2010	Anthracene	0.055
HA-10	0	12/13/2010	Anthracene	<0.10
HA-11	0	12/13/2010	Anthracene	<0.10
HA-13	0	12/13/2010	Anthracene	<0.10
HA-9	0	12/13/2010	Anthracene	<0.10
B-4	2	1/22/2013	Anthracene	<0.11
B-5	2	1/22/2013	Anthracene	<0.11
N-3	2	1/22/2013	Anthracene	<0.11
W-1	2	1/22/2013	Anthracene	<0.11
OX-2	3	2/21/2013	Anthracene	<0.17
OX-3	3	2/21/2013	Anthracene	<0.17
HA-14	0	4/18/2012	Anthracene	<0.18
HA-16	0	4/18/2012	Anthracene	<0.18
B-1	2	1/22/2013	Anthracene	<0.21

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Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
N-1	2	1/22/2013	Anthracene	<0.21
OX-1	3	2/21/2013	Anthracene	<0.33
HA-15	0	4/18/2012	Anthracene	<0.45
HA-17	0	4/18/2012	Anthracene	<0.45
HA-18	0	4/18/2012	Anthracene	<0.45
HA-10	0	4/22/2013	Anthracene	<0.66
HA-10	1	4/22/2013	Anthracene	<0.66
HA-9	0	4/22/2013	Anthracene	<1.3
HA-12	0	4/22/2013	Anthracene	<3.3
HA-13	0	4/22/2013	Anthracene	<6.6
VP-8	4.5	5/29/2007	Benzene	0.00096
MW-13	10	3/24/2015	Benzene	<0.00099
MW-13	5	3/24/2015	Benzene	<0.00099
B-10	6	7/17/1996	Benzene	<0.0050
B-11	5	7/17/1996	Benzene	<0.0050
B-12	5.5	7/17/1996	Benzene	<0.0050
B-13	5.5	7/17/1996	Benzene	<0.0050
B-17	5	11/22/2000	Benzene	<0.0050
B-18	5	11/22/2000	Benzene	<0.0050
B-18	7	11/22/2000	Benzene	<0.0050
B-19	5	11/22/2000	Benzene	<0.0050
B-20	7.5	4/11/2002	Benzene	<0.005
B-21	3	4/11/2002	Benzene	<0.005
B-21	8	4/11/2002	Benzene	<0.005
B-22	3	4/11/2002	Benzene	<0.005
B-23	5	1/3/2006	Benzene	<0.0050 g
B-24	5	12/20/2010	Benzene	<0.0050
B-25	5	12/23/2010	Benzene	<0.0050
B-26	5	12/20/2010	Benzene	<0.0050
B-27	5	12/20/2010	Benzene	<0.0050
B-28	5	12/20/2010	Benzene	<0.0050
B-29	5	12/20/2010	Benzene	<0.0050
B-31	5	12/22/2010	Benzene	<0.0050
B-33	5	12/22/2010	Benzene	<0.0050
B-34	5	12/22/2010	Benzene	<0.0050
B-35	5	12/22/2010	Benzene	<0.0050
B-36	5	12/22/2010	Benzene	<0.0050
B-37	5	12/22/2010	Benzene	<0.0050
B-38	5	12/21/2010	Benzene	<0.0050
B-38	8.2	12/21/2010	Benzene	<0.0050
B-40	5	12/21/2010	Benzene	<0.0050
B-45	5	12/21/2010	Benzene	<0.0050
B-46	5	12/21/2010	Benzene	<0.0050
B-47	5	12/21/2010	Benzene	<0.0050
B-48	5	12/21/2010	Benzene	<0.0050
GP-1	4.5	8/31/2005	Benzene	<0.0050
GP-1	5	8/29/2005	Benzene	<0.0050
GP-4	4.5	8/31/2005	Benzene	<0.0050
GP-5	4.5	8/30/2005	Benzene	<0.0050

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Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
GP-6	5	8/29/2005	Benzene	<0.0050
GP-7	5	8/30/2005	Benzene	<0.0050
GP-8	4.5	8/30/2005	Benzene	<0.0050
GP-9	4.5	8/31/2005	Benzene	<0.0050
MW-10	5	8/10/2010	Benzene	<0.0050
MW-10	9.5	8/10/2010	Benzene	<0.0050
MW-11	5	8/10/2010	Benzene	<0.0050
MW-11	9.5	8/10/2010	Benzene	<0.0050
MW-12	10	2/28/2006	Benzene	<0.0050
MW-12	5	2/28/2006	Benzene	<0.0050
MW-14	5	2/28/2006	Benzene	<0.0050
MW-3	5	11/22/2000	Benzene	<0.0050
MW-4	5	11/22/2000	Benzene	<0.0050
MW-5	5	11/22/2000	Benzene	<0.0050
MW-7	5.5	1/4/2006	Benzene	<0.0050 g
MW-8	6.5	1/3/2006	Benzene	<0.0050 g
MW-9	5	8/10/2010	Benzene	<0.0050
MW-9	9.5	8/10/2010	Benzene	<0.0050
VP-7	4.5	6/6/2007	Benzene	<0.0050
VP-9	4.5	7/23/2008	Benzene	<0.0050
B-20	4.5	4/11/2002	Benzene	0.0075
MW-14	10	2/28/2006	Benzene	0.0083
B-44	5	12/21/2010	Benzene	0.0088
B-29	10	12/20/2010	Benzene	0.01
B-19	7	11/22/2000	Benzene	0.02
MW-6	5	1/4/2006	Benzene	<0.025 g
GP-3	5	8/29/2005	Benzene	0.027
GP-2	4.5	8/29/2005	Benzene	0.035
B-30	5	12/23/2010	Benzene	0.064
B-3	6	5/23/1995	Benzene	<0.1
B-4	6	5/23/1995	Benzene	<0.1
B-6	5	5/23/1995	Benzene	<0.1
B-7	10	5/23/1995	Benzene	<0.1
B-7	5	5/23/1995	Benzene	<0.1
B-8	10	5/23/1995	Benzene	<0.1
B-22	8	4/11/2002	Benzene	0.17
V-2	5.5	7/19/1996	Benzene	0.29
B-6	10	5/23/1995	Benzene	0.3
B-17	7	11/22/2000	Benzene	0.31
B-24	10	12/20/2010	Benzene	<0.50
B-31	10	12/22/2010	Benzene	<0.50
B-32	5	12/22/2010	Benzene	<0.50
B-32	7	12/22/2010	Benzene	<0.50
B-34	10	12/22/2010	Benzene	<0.50
B-35	10	12/22/2010	Benzene	<0.50
B-36	10	12/22/2010	Benzene	<0.50
B-39	5	12/21/2010	Benzene	<0.50
B-39	8.5	12/21/2010	Benzene	<0.50
B-41	5	12/20/2010	Benzene	<0.50

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Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-43	5	12/21/2010	Benzene	<0.50
B-45	10	12/21/2010	Benzene	<0.50
B-46	8.5	12/21/2010	Benzene	<0.50
B-47	10	12/21/2010	Benzene	<0.50
B-48	10	12/21/2010	Benzene	<0.50
GP-1	10	8/29/2005	Benzene	<0.50
GP-6	9.5	8/29/2005	Benzene	<0.50
GP-7	9.5	8/30/2005	Benzene	<0.50
B-2	5	5/23/1995	Benzene	0.6
MW-6	10	1/4/2006	Benzene	<1.2 i
B-28	10	12/20/2010	Benzene	2
B-25	10	12/23/2010	Benzene	<2.5
B-32	10	12/22/2010	Benzene	<2.5
B-37	10	12/22/2010	Benzene	<2.5
B-38	10	12/21/2010	Benzene	<2.5
B-39	10	12/21/2010	Benzene	2.5
B-43	10	12/21/2010	Benzene	<2.5
B-44	10	12/21/2010	Benzene	<2.5
B-46	10	12/21/2010	Benzene	<2.5
B-33	10	12/22/2010	Benzene	2.8
B-26	10	12/20/2010	Benzene	3
B-42	5	12/20/2010	Benzene	<5.0
B-30	10	12/23/2010	Benzene	6.1
B-23	10	1/3/2006	Benzene	<6.2 i
B-27	10	12/20/2010	Benzene	9.9
B-40	10	12/21/2010	Benzene	<10
B-41	10	12/20/2010	Benzene	<10
B-41	8.5	12/20/2010	Benzene	<10
GP-3	8.5	8/29/2005	Benzene	15
B-42	10	12/20/2010	Benzene	72
HA-1	5	4/8/2009	Benzo(a) Anthracene	<0.020
HA-10	4.5	12/13/2010	Benzo(a) Anthracene	<0.020
HA-11	4.5	12/13/2010	Benzo(a) Anthracene	<0.020
HA-12	4.5	12/13/2010	Benzo(a) Anthracene	<0.020
HA-13	1	12/13/2010	Benzo(a) Anthracene	<0.020
HA-13	4.5	12/13/2010	Benzo(a) Anthracene	<0.020
HA-2	5	4/8/2009	Benzo(a) Anthracene	<0.020
HA-3	5	4/8/2009	Benzo(a) Anthracene	<0.020
HA-4	5	4/8/2009	Benzo(a) Anthracene	<0.020
HA-5	5	4/8/2009	Benzo(a) Anthracene	<0.020
HA-6	5	4/8/2009	Benzo(a) Anthracene	<0.020
HA-7	5	4/8/2009	Benzo(a) Anthracene	<0.020
HA-8	5	4/8/2009	Benzo(a) Anthracene	<0.020
HA-9	4.5	12/13/2010	Benzo(a) Anthracene	<0.020
HA-14	1	4/18/2012	Benzo(a) Anthracene	<0.030
HA-14	4.5	4/18/2012	Benzo(a) Anthracene	<0.030
HA-15	4.5	4/18/2012	Benzo(a) Anthracene	<0.030
HA-17	1	4/18/2012	Benzo(a) Anthracene	<0.030
HA-17	4.5	4/18/2012	Benzo(a) Anthracene	<0.030

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-18	4.5	4/18/2012	Benzo(a) Anthracene	<0.030
B-2	2	1/22/2013	Benzo(a) Anthracene	<0.033
B-3	2	1/22/2013	Benzo(a) Anthracene	<0.033
N-2	2	1/22/2013	Benzo(a) Anthracene	<0.033
S-1	2	1/22/2013	Benzo(a) Anthracene	<0.033
S-2	2	1/22/2013	Benzo(a) Anthracene	<0.033
S-3	2	1/22/2013	Benzo(a) Anthracene	<0.033
HA-15	1	4/18/2012	Benzo(a) Anthracene	<0.045
HA-16	1	4/18/2012	Benzo(a) Anthracene	<0.045
HA-16	4.5	4/18/2012	Benzo(a) Anthracene	<0.045
HA-18	1	4/18/2012	Benzo(a) Anthracene	<0.045
HA-11	1	12/13/2010	Benzo(a) Anthracene	0.047
HA-12	1	12/13/2010	Benzo(a) Anthracene	0.05
B-4	2	1/22/2013	Benzo(a) Anthracene	<0.066
W-1	2	1/22/2013	Benzo(a) Anthracene	<0.067
N-3	2	1/22/2013	Benzo(a) Anthracene	0.0767 b
B-5	2	1/22/2013	Benzo(a) Anthracene	0.0800 b
HA-9	1	12/13/2010	Benzo(a) Anthracene	0.093
HA-10	0	12/13/2010	Benzo(a) Anthracene	0.11
HA-11	0	12/13/2010	Benzo(a) Anthracene	0.11
HA-10	1	12/13/2010	Benzo(a) Anthracene	0.12
HA-9	0	12/13/2010	Benzo(a) Anthracene	0.12
B-1	2	1/22/2013	Benzo(a) Anthracene	<0.13
N-1	2	1/22/2013	Benzo(a) Anthracene	<0.13
OX-2	3	2/21/2013	Benzo(a) Anthracene	<0.17
OX-3	3	2/21/2013	Benzo(a) Anthracene	<0.17
HA-14	0	4/18/2012	Benzo(a) Anthracene	<0.18
HA-16	0	4/18/2012	Benzo(a) Anthracene	<0.18
HA-12	0	12/13/2010	Benzo(a) Anthracene	0.2
HA-13	0	12/13/2010	Benzo(a) Anthracene	0.22
OX-1	3	2/21/2013	Benzo(a) Anthracene	<0.33
HA-15	0	4/18/2012	Benzo(a) Anthracene	<0.45
HA-17	0	4/18/2012	Benzo(a) Anthracene	<0.45
HA-18	0	4/18/2012	Benzo(a) Anthracene	<0.45
HA-10	0	4/22/2013	Benzo(a) Anthracene	<0.66
HA-10	1	4/22/2013	Benzo(a) Anthracene	<0.66
HA-9	0	4/22/2013	Benzo(a) Anthracene	<1.3
HA-12	0	4/22/2013	Benzo(a) Anthracene	<3.3
HA-13	0	4/22/2013	Benzo(a) Anthracene	<6.6
HA-1	5	4/8/2009	Benzo(a) Pyrene	<0.020
HA-10	4.5	12/13/2010	Benzo(a) Pyrene	<0.020
HA-11	4.5	12/13/2010	Benzo(a) Pyrene	<0.020
HA-12	4.5	12/13/2010	Benzo(a) Pyrene	<0.020
HA-13	1	12/13/2010	Benzo(a) Pyrene	<0.020
HA-13	4.5	12/13/2010	Benzo(a) Pyrene	<0.020
HA-2	5	4/8/2009	Benzo(a) Pyrene	<0.020
HA-3	5	4/8/2009	Benzo(a) Pyrene	<0.020
HA-4	5	4/8/2009	Benzo(a) Pyrene	<0.020
HA-5	5	4/8/2009	Benzo(a) Pyrene	<0.020

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-6	5	4/8/2009	Benzo(a) Pyrene	<0.020
HA-7	5	4/8/2009	Benzo(a) Pyrene	<0.020
HA-8	5	4/8/2009	Benzo(a) Pyrene	<0.020
HA-9	4.5	12/13/2010	Benzo(a) Pyrene	<0.020
HA-14	1	4/18/2012	Benzo(a) Pyrene	<0.030
HA-14	4.5	4/18/2012	Benzo(a) Pyrene	<0.030
HA-15	4.5	4/18/2012	Benzo(a) Pyrene	<0.030
HA-17	1	4/18/2012	Benzo(a) Pyrene	<0.030
HA-17	4.5	4/18/2012	Benzo(a) Pyrene	<0.030
HA-18	4.5	4/18/2012	Benzo(a) Pyrene	<0.030
B-2	2	1/22/2013	Benzo(a) Pyrene	<0.033
B-3	2	1/22/2013	Benzo(a) Pyrene	<0.033
N-2	2	1/22/2013	Benzo(a) Pyrene	<0.033
S-1	2	1/22/2013	Benzo(a) Pyrene	<0.033
S-2	2	1/22/2013	Benzo(a) Pyrene	<0.033
S-3	2	1/22/2013	Benzo(a) Pyrene	<0.033
HA-11	1	12/13/2010	Benzo(a) Pyrene	0.043
HA-12	1	12/13/2010	Benzo(a) Pyrene	0.045
HA-15	1	4/18/2012	Benzo(a) Pyrene	<0.045
HA-16	1	4/18/2012	Benzo(a) Pyrene	<0.045
HA-16	4.5	4/18/2012	Benzo(a) Pyrene	<0.045
HA-18	1	4/18/2012	Benzo(a) Pyrene	<0.045
B-4	2	1/22/2013	Benzo(a) Pyrene	<0.066
W-1	2	1/22/2013	Benzo(a) Pyrene	<0.067
B-5	2	1/22/2013	Benzo(a) Pyrene	0.0868 b
HA-9	1	12/13/2010	Benzo(a) Pyrene	0.092
N-3	2	1/22/2013	Benzo(a) Pyrene	0.100 b
B-1	2	1/22/2013	Benzo(a) Pyrene	<0.13
N-1	2	1/22/2013	Benzo(a) Pyrene	<0.13
HA-10	0	12/13/2010	Benzo(a) Pyrene	0.14
HA-9	0	12/13/2010	Benzo(a) Pyrene	0.14
HA-10	1	12/13/2010	Benzo(a) Pyrene	0.16
HA-11	0	12/13/2010	Benzo(a) Pyrene	0.16
OX-2	3	2/21/2013	Benzo(a) Pyrene	<0.17
OX-3	3	2/21/2013	Benzo(a) Pyrene	<0.17
HA-16	0	4/18/2012	Benzo(a) Pyrene	<0.18
HA-14	0	4/18/2012	Benzo(a) Pyrene	0.22
HA-13	0	12/13/2010	Benzo(a) Pyrene	0.24
HA-12	0	12/13/2010	Benzo(a) Pyrene	0.26
OX-1	3	2/21/2013	Benzo(a) Pyrene	<0.33
HA-15	0	4/18/2012	Benzo(a) Pyrene	<0.45
HA-17	0	4/18/2012	Benzo(a) Pyrene	<0.45
HA-18	0	4/18/2012	Benzo(a) Pyrene	<0.45
HA-10	1	4/22/2013	Benzo(a) Pyrene	<0.66
HA-9	0	4/22/2013	Benzo(a) Pyrene	<1.3
HA-10	0	4/22/2013	Benzo(a) Pyrene	1.7
HA-12	0	4/22/2013	Benzo(a) Pyrene	<3.3
HA-13	0	4/22/2013	Benzo(a) Pyrene	<6.6
HA-1	5	4/8/2009	Benzo(b) Fluoranthene	<0.020

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-10	4.5	12/13/2010	Benzo(b) Fluoranthene	<0.020
HA-11	4.5	12/13/2010	Benzo(b) Fluoranthene	<0.020
HA-12	4.5	12/13/2010	Benzo(b) Fluoranthene	<0.020
HA-13	1	12/13/2010	Benzo(b) Fluoranthene	<0.020
HA-13	4.5	12/13/2010	Benzo(b) Fluoranthene	<0.020
HA-2	5	4/8/2009	Benzo(b) Fluoranthene	<0.020
HA-3	5	4/8/2009	Benzo(b) Fluoranthene	<0.020
HA-4	5	4/8/2009	Benzo(b) Fluoranthene	<0.020
HA-5	5	4/8/2009	Benzo(b) Fluoranthene	<0.020
HA-6	5	4/8/2009	Benzo(b) Fluoranthene	<0.020
HA-7	5	4/8/2009	Benzo(b) Fluoranthene	<0.020
HA-8	5	4/8/2009	Benzo(b) Fluoranthene	<0.020
HA-9	4.5	12/13/2010	Benzo(b) Fluoranthene	<0.020
HA-11	1	12/13/2010	Benzo(b) Fluoranthene	0.027
HA-14	1	4/18/2012	Benzo(b) Fluoranthene	<0.030
HA-14	4.5	4/18/2012	Benzo(b) Fluoranthene	<0.030
HA-15	4.5	4/18/2012	Benzo(b) Fluoranthene	<0.030
HA-17	1	4/18/2012	Benzo(b) Fluoranthene	<0.030
HA-17	4.5	4/18/2012	Benzo(b) Fluoranthene	<0.030
HA-18	4.5	4/18/2012	Benzo(b) Fluoranthene	<0.030
B-2	2	1/22/2013	Benzo(b) Fluoranthene	<0.033
B-3	2	1/22/2013	Benzo(b) Fluoranthene	<0.033
N-2	2	1/22/2013	Benzo(b) Fluoranthene	<0.033
S-1	2	1/22/2013	Benzo(b) Fluoranthene	<0.033
S-2	2	1/22/2013	Benzo(b) Fluoranthene	<0.033
S-3	2	1/22/2013	Benzo(b) Fluoranthene	<0.033
HA-12	1	12/13/2010	Benzo(b) Fluoranthene	0.035
HA-15	1	4/18/2012	Benzo(b) Fluoranthene	<0.045
HA-16	1	4/18/2012	Benzo(b) Fluoranthene	<0.045
HA-16	4.5	4/18/2012	Benzo(b) Fluoranthene	<0.045
HA-18	1	4/18/2012	Benzo(b) Fluoranthene	<0.045
HA-15	0	4/18/2012	Benzo(b) Fluoranthene	0.058
B-4	2	1/22/2013	Benzo(b) Fluoranthene	<0.066
W-1	2	1/22/2013	Benzo(b) Fluoranthene	<0.067
HA-9	1	12/13/2010	Benzo(b) Fluoranthene	0.071
B-5	2	1/22/2013	Benzo(b) Fluoranthene	0.0858 b
N-3	2	1/22/2013	Benzo(b) Fluoranthene	0.0900 b
HA-10	1	12/13/2010	Benzo(b) Fluoranthene	0.11
HA-9	0	12/13/2010	Benzo(b) Fluoranthene	0.12
B-1	2	1/22/2013	Benzo(b) Fluoranthene	<0.13
N-1	2	1/22/2013	Benzo(b) Fluoranthene	<0.13
HA-11	0	12/13/2010	Benzo(b) Fluoranthene	0.14
HA-10	0	12/13/2010	Benzo(b) Fluoranthene	0.15
OX-2	3	2/21/2013	Benzo(b) Fluoranthene	<0.17
OX-3	3	2/21/2013	Benzo(b) Fluoranthene	<0.17
HA-12	0	12/13/2010	Benzo(b) Fluoranthene	0.18
HA-13	0	12/13/2010	Benzo(b) Fluoranthene	0.18
HA-16	0	4/18/2012	Benzo(b) Fluoranthene	<0.18
HA-14	0	4/18/2012	Benzo(b) Fluoranthene	0.25

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
OX-1	3	2/21/2013	Benzo(b) Fluoranthene	<0.33
HA-17	0	4/18/2012	Benzo(b) Fluoranthene	<0.45
HA-18	0	4/18/2012	Benzo(b) Fluoranthene	<0.45
HA-10	1	4/22/2013	Benzo(b) Fluoranthene	<0.66
HA-9	0	4/22/2013	Benzo(b) Fluoranthene	<1.3
HA-10	0	4/22/2013	Benzo(b) Fluoranthene	2
HA-12	0	4/22/2013	Benzo(b) Fluoranthene	<3.3
HA-13	0	4/22/2013	Benzo(b) Fluoranthene	<6.6
HA-1	5	4/8/2009	Benzo(g,h,i) Perylene	<0.020
HA-10	4.5	12/13/2010	Benzo(g,h,i) Perylene	<0.020
HA-11	4.5	12/13/2010	Benzo(g,h,i) Perylene	<0.020
HA-12	4.5	12/13/2010	Benzo(g,h,i) Perylene	<0.020
HA-13	1	12/13/2010	Benzo(g,h,i) Perylene	<0.020
HA-13	4.5	12/13/2010	Benzo(g,h,i) Perylene	<0.020
HA-2	5	4/8/2009	Benzo(g,h,i) Perylene	<0.020
HA-3	5	4/8/2009	Benzo(g,h,i) Perylene	<0.020
HA-4	5	4/8/2009	Benzo(g,h,i) Perylene	<0.020
HA-5	5	4/8/2009	Benzo(g,h,i) Perylene	<0.020
HA-6	5	4/8/2009	Benzo(g,h,i) Perylene	<0.020
HA-7	5	4/8/2009	Benzo(g,h,i) Perylene	<0.020
HA-8	5	4/8/2009	Benzo(g,h,i) Perylene	<0.020
HA-9	4.5	12/13/2010	Benzo(g,h,i) Perylene	<0.020
HA-11	1	12/13/2010	Benzo(g,h,i) Perylene	0.024
HA-14	1	4/18/2012	Benzo(g,h,i) Perylene	<0.030
HA-14	4.5	4/18/2012	Benzo(g,h,i) Perylene	<0.030
HA-15	4.5	4/18/2012	Benzo(g,h,i) Perylene	<0.030
HA-17	1	4/18/2012	Benzo(g,h,i) Perylene	<0.030
HA-17	4.5	4/18/2012	Benzo(g,h,i) Perylene	<0.030
HA-18	4.5	4/18/2012	Benzo(g,h,i) Perylene	<0.030
HA-12	1	12/13/2010	Benzo(g,h,i) Perylene	0.035
B-2	2	1/22/2013	Benzo(g,h,i) Perylene	<0.043
B-3	2	1/22/2013	Benzo(g,h,i) Perylene	<0.043
N-2	2	1/22/2013	Benzo(g,h,i) Perylene	<0.043
S-1	2	1/22/2013	Benzo(g,h,i) Perylene	<0.043
S-2	2	1/22/2013	Benzo(g,h,i) Perylene	<0.043
S-3	2	1/22/2013	Benzo(g,h,i) Perylene	<0.043
HA-15	1	4/18/2012	Benzo(g,h,i) Perylene	<0.045
HA-16	1	4/18/2012	Benzo(g,h,i) Perylene	<0.045
HA-16	4.5	4/18/2012	Benzo(g,h,i) Perylene	<0.045
HA-18	1	4/18/2012	Benzo(g,h,i) Perylene	<0.045
HA-9	1	12/13/2010	Benzo(g,h,i) Perylene	0.057
B-4	2	1/22/2013	Benzo(g,h,i) Perylene	<0.086
B-5	2	1/22/2013	Benzo(g,h,i) Perylene	<0.086
N-3	2	1/22/2013	Benzo(g,h,i) Perylene	<0.086
W-1	2	1/22/2013	Benzo(g,h,i) Perylene	<0.087
HA-10	1	12/13/2010	Benzo(g,h,i) Perylene	0.14
HA-9	0	12/13/2010	Benzo(g,h,i) Perylene	0.15
B-1	2	1/22/2013	Benzo(g,h,i) Perylene	<0.17
N-1	2	1/22/2013	Benzo(g,h,i) Perylene	<0.17

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
OX-2	3	2/21/2013	Benzo(g,h,i) Perylene	<0.17
OX-3	3	2/21/2013	Benzo(g,h,i) Perylene	<0.17
HA-11	0	12/13/2010	Benzo(g,h,i) Perylene	0.18
HA-16	0	4/18/2012	Benzo(g,h,i) Perylene	<0.18
HA-13	0	12/13/2010	Benzo(g,h,i) Perylene	0.19
HA-14	0	4/18/2012	Benzo(g,h,i) Perylene	0.2
HA-12	0	12/13/2010	Benzo(g,h,i) Perylene	0.21
HA-10	0	12/13/2010	Benzo(g,h,i) Perylene	0.22
OX-1	3	2/21/2013	Benzo(g,h,i) Perylene	<0.33
HA-15	0	4/18/2012	Benzo(g,h,i) Perylene	<0.45
HA-17	0	4/18/2012	Benzo(g,h,i) Perylene	<0.45
HA-18	0	4/18/2012	Benzo(g,h,i) Perylene	<0.45
HA-10	1	4/22/2013	Benzo(g,h,i) Perylene	<0.66
HA-9	0	4/22/2013	Benzo(g,h,i) Perylene	<1.3
HA-10	0	4/22/2013	Benzo(g,h,i) Perylene	2.4
HA-12	0	4/22/2013	Benzo(g,h,i) Perylene	<3.3
HA-13	0	4/22/2013	Benzo(g,h,i) Perylene	<6.6
HA-1	5	4/8/2009	Benzo(k) Fluoranthene	<0.020
HA-10	4.5	12/13/2010	Benzo(k) Fluoranthene	<0.020
HA-11	4.5	12/13/2010	Benzo(k) Fluoranthene	<0.020
HA-12	4.5	12/13/2010	Benzo(k) Fluoranthene	<0.020
HA-13	1	12/13/2010	Benzo(k) Fluoranthene	<0.020
HA-13	4.5	12/13/2010	Benzo(k) Fluoranthene	<0.020
HA-2	5	4/8/2009	Benzo(k) Fluoranthene	<0.020
HA-3	5	4/8/2009	Benzo(k) Fluoranthene	<0.020
HA-4	5	4/8/2009	Benzo(k) Fluoranthene	<0.020
HA-5	5	4/8/2009	Benzo(k) Fluoranthene	<0.020
HA-6	5	4/8/2009	Benzo(k) Fluoranthene	<0.020
HA-7	5	4/8/2009	Benzo(k) Fluoranthene	<0.020
HA-8	5	4/8/2009	Benzo(k) Fluoranthene	<0.020
HA-9	4.5	12/13/2010	Benzo(k) Fluoranthene	<0.020
HA-14	1	4/18/2012	Benzo(k) Fluoranthene	<0.030
HA-14	4.5	4/18/2012	Benzo(k) Fluoranthene	<0.030
HA-15	4.5	4/18/2012	Benzo(k) Fluoranthene	<0.030
HA-17	1	4/18/2012	Benzo(k) Fluoranthene	<0.030
HA-17	4.5	4/18/2012	Benzo(k) Fluoranthene	<0.030
HA-18	4.5	4/18/2012	Benzo(k) Fluoranthene	<0.030
B-2	2	1/22/2013	Benzo(k) Fluoranthene	<0.033
B-3	2	1/22/2013	Benzo(k) Fluoranthene	<0.033
N-2	2	1/22/2013	Benzo(k) Fluoranthene	<0.033
S-1	2	1/22/2013	Benzo(k) Fluoranthene	<0.033
S-2	2	1/22/2013	Benzo(k) Fluoranthene	<0.033
S-3	2	1/22/2013	Benzo(k) Fluoranthene	<0.033
HA-11	1	12/13/2010	Benzo(k) Fluoranthene	0.035
HA-12	1	12/13/2010	Benzo(k) Fluoranthene	0.04
HA-15	1	4/18/2012	Benzo(k) Fluoranthene	<0.045
HA-16	1	4/18/2012	Benzo(k) Fluoranthene	<0.045
HA-16	4.5	4/18/2012	Benzo(k) Fluoranthene	<0.045
HA-18	1	4/18/2012	Benzo(k) Fluoranthene	<0.045

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-9	1	12/13/2010	Benzo(k) Fluoranthene	0.062
B-4	2	1/22/2013	Benzo(k) Fluoranthene	<0.066
W-1	2	1/22/2013	Benzo(k) Fluoranthene	<0.067
B-5	2	1/22/2013	Benzo(k) Fluoranthene	0.0687 b
N-3	2	1/22/2013	Benzo(k) Fluoranthene	0.0808 b
HA-10	1	12/13/2010	Benzo(k) Fluoranthene	0.094
HA-11	0	12/13/2010	Benzo(k) Fluoranthene	0.1
HA-9	0	12/13/2010	Benzo(k) Fluoranthene	0.1
HA-10	0	12/13/2010	Benzo(k) Fluoranthene	0.11
B-1	2	1/22/2013	Benzo(k) Fluoranthene	<0.13
N-1	2	1/22/2013	Benzo(k) Fluoranthene	<0.13
HA-12	0	12/13/2010	Benzo(k) Fluoranthene	0.17
OX-2	3	2/21/2013	Benzo(k) Fluoranthene	<0.17
OX-3	3	2/21/2013	Benzo(k) Fluoranthene	<0.17
HA-14	0	4/18/2012	Benzo(k) Fluoranthene	<0.18
HA-16	0	4/18/2012	Benzo(k) Fluoranthene	<0.18
HA-13	0	12/13/2010	Benzo(k) Fluoranthene	0.19
OX-1	3	2/21/2013	Benzo(k) Fluoranthene	<0.33
HA-15	0	4/18/2012	Benzo(k) Fluoranthene	<0.45
HA-17	0	4/18/2012	Benzo(k) Fluoranthene	<0.45
HA-18	0	4/18/2012	Benzo(k) Fluoranthene	<0.45
HA-10	0	4/22/2013	Benzo(k) Fluoranthene	<0.66
HA-10	1	4/22/2013	Benzo(k) Fluoranthene	<0.66
HA-9	0	4/22/2013	Benzo(k) Fluoranthene	<1.3
HA-12	0	4/22/2013	Benzo(k) Fluoranthene	<3.3
HA-13	0	4/22/2013	Benzo(k) Fluoranthene	<6.6
S-1	2	1/22/2013	Bis(2-ethylhexyl)phthalate	<0.067
B-3	2	1/22/2013	Bis(2-ethylhexyl)phthalate	0.0683 b
OX-3	3	2/21/2013	Bis(2-ethylhexyl)phthalate	0.0771 b
B-4	2	1/22/2013	Bis(2-ethylhexyl)phthalate	<0.13
B-5	2	1/22/2013	Bis(2-ethylhexyl)phthalate	<0.13
W-1	2	1/22/2013	Bis(2-ethylhexyl)phthalate	<0.13
B-1	2	1/22/2013	Bis(2-ethylhexyl)phthalate	<0.26
N-1	2	1/22/2013	Bis(2-ethylhexyl)phthalate	<0.27
OX-2	3	2/21/2013	Bis(2-ethylhexyl)phthalate	<0.33
N-3	2	1/22/2013	Bis(2-ethylhexyl)phthalate	0.415 b
B-2	2	1/22/2013	Bis(2-ethylhexyl)phthalate	0.467
HA-10	0	4/22/2013	Bis(2-ethylhexyl)phthalate	<0.66
N-2	2	1/22/2013	Bis(2-ethylhexyl)phthalate	<0.66
OX-1	3	2/21/2013	Bis(2-ethylhexyl)phthalate	<0.66
S-2	2	1/22/2013	Bis(2-ethylhexyl)phthalate	<0.66
S-3	2	1/22/2013	Bis(2-ethylhexyl)phthalate	<0.66
HA-10	1	4/22/2013	Bis(2-ethylhexyl)phthalate	1.3 c
HA-9	0	4/22/2013	Bis(2-ethylhexyl)phthalate	3.7 c
HA-12	0	4/22/2013	Bis(2-ethylhexyl)phthalate	5.6 c
HA-13	0	4/22/2013	Bis(2-ethylhexyl)phthalate	<6.6
HA-1	5	4/8/2009	Chrysene	<0.020
HA-10	4.5	12/13/2010	Chrysene	<0.020
HA-11	4.5	12/13/2010	Chrysene	<0.020

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-12	4.5	12/13/2010	Chrysene	<0.020
HA-13	1	12/13/2010	Chrysene	<0.020
HA-13	4.5	12/13/2010	Chrysene	<0.020
HA-2	5	4/8/2009	Chrysene	<0.020
HA-3	5	4/8/2009	Chrysene	<0.020
HA-4	5	4/8/2009	Chrysene	<0.020
HA-5	5	4/8/2009	Chrysene	<0.020
HA-6	5	4/8/2009	Chrysene	<0.020
HA-7	5	4/8/2009	Chrysene	<0.020
HA-8	5	4/8/2009	Chrysene	<0.020
HA-9	4.5	12/13/2010	Chrysene	<0.020
HA-14	1	4/18/2012	Chrysene	<0.030
HA-14	4.5	4/18/2012	Chrysene	<0.030
HA-15	4.5	4/18/2012	Chrysene	<0.030
HA-17	1	4/18/2012	Chrysene	<0.030
HA-17	4.5	4/18/2012	Chrysene	<0.030
HA-18	4.5	4/18/2012	Chrysene	<0.030
B-2	2	1/22/2013	Chrysene	<0.033
B-3	2	1/22/2013	Chrysene	<0.033
N-2	2	1/22/2013	Chrysene	<0.033
S-1	2	1/22/2013	Chrysene	<0.033
S-2	2	1/22/2013	Chrysene	<0.033
S-3	2	1/22/2013	Chrysene	<0.033
HA-15	1	4/18/2012	Chrysene	<0.045
HA-16	1	4/18/2012	Chrysene	<0.045
HA-16	4.5	4/18/2012	Chrysene	<0.045
HA-18	1	4/18/2012	Chrysene	<0.045
HA-11	1	12/13/2010	Chrysene	0.052
HA-12	1	12/13/2010	Chrysene	0.057
B-4	2	1/22/2013	Chrysene	<0.066
W-1	2	1/22/2013	Chrysene	<0.067
B-5	2	1/22/2013	Chrysene	0.0832 b
N-3	2	1/22/2013	Chrysene	0.0925 b
HA-9	1	12/13/2010	Chrysene	0.1
B-1	2	1/22/2013	Chrysene	<0.13
N-1	2	1/22/2013	Chrysene	<0.13
HA-10	1	12/13/2010	Chrysene	0.15
HA-9	0	12/13/2010	Chrysene	0.15
HA-10	0	12/13/2010	Chrysene	0.17
HA-11	0	12/13/2010	Chrysene	0.17
OX-2	3	2/21/2013	Chrysene	<0.17
OX-3	3	2/21/2013	Chrysene	<0.17
HA-14	0	4/18/2012	Chrysene	<0.18
HA-16	0	4/18/2012	Chrysene	<0.18
HA-12	0	12/13/2010	Chrysene	0.25
HA-13	0	12/13/2010	Chrysene	0.25
OX-1	3	2/21/2013	Chrysene	<0.33
HA-15	0	4/18/2012	Chrysene	<0.45
HA-17	0	4/18/2012	Chrysene	<0.45

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-18	0	4/18/2012	Chrysene	<0.45
HA-10	1	4/22/2013	Chrysene	<0.66
HA-10	0	4/22/2013	Chrysene	1
HA-9	0	4/22/2013	Chrysene	<1.3
HA-12	0	4/22/2013	Chrysene	<3.3
HA-13	0	4/22/2013	Chrysene	<6.6
HA-1	5	4/8/2009	Dibenz(a,h) Anthracene	<0.020
HA-10	4.5	12/13/2010	Dibenz(a,h) Anthracene	<0.020
HA-11	1	12/13/2010	Dibenz(a,h) Anthracene	<0.020
HA-11	4.5	12/13/2010	Dibenz(a,h) Anthracene	<0.020
HA-12	1	12/13/2010	Dibenz(a,h) Anthracene	<0.020
HA-12	4.5	12/13/2010	Dibenz(a,h) Anthracene	<0.020
HA-13	1	12/13/2010	Dibenz(a,h) Anthracene	<0.020
HA-13	4.5	12/13/2010	Dibenz(a,h) Anthracene	<0.020
HA-2	5	4/8/2009	Dibenz(a,h) Anthracene	<0.020
HA-3	5	4/8/2009	Dibenz(a,h) Anthracene	<0.020
HA-4	5	4/8/2009	Dibenz(a,h) Anthracene	<0.020
HA-5	5	4/8/2009	Dibenz(a,h) Anthracene	<0.020
HA-6	5	4/8/2009	Dibenz(a,h) Anthracene	<0.020
HA-7	5	4/8/2009	Dibenz(a,h) Anthracene	<0.020
HA-8	5	4/8/2009	Dibenz(a,h) Anthracene	<0.020
HA-9	1	12/13/2010	Dibenz(a,h) Anthracene	<0.020
HA-9	4.5	12/13/2010	Dibenz(a,h) Anthracene	<0.020
HA-10	1	12/13/2010	Dibenz(a,h) Anthracene	0.022
HA-14	1	4/18/2012	Dibenz(a,h) Anthracene	<0.030
HA-14	4.5	4/18/2012	Dibenz(a,h) Anthracene	<0.030
HA-15	4.5	4/18/2012	Dibenz(a,h) Anthracene	<0.030
HA-17	1	4/18/2012	Dibenz(a,h) Anthracene	<0.030
HA-17	4.5	4/18/2012	Dibenz(a,h) Anthracene	<0.030
HA-18	4.5	4/18/2012	Dibenz(a,h) Anthracene	<0.030
HA-12	0	12/13/2010	Dibenz(a,h) Anthracene	0.035
B-2	2	1/22/2013	Dibenz(a,h) Anthracene	<0.041
B-3	2	1/22/2013	Dibenz(a,h) Anthracene	<0.041
N-2	2	1/22/2013	Dibenz(a,h) Anthracene	<0.041
S-1	2	1/22/2013	Dibenz(a,h) Anthracene	<0.041
S-2	2	1/22/2013	Dibenz(a,h) Anthracene	<0.041
S-3	2	1/22/2013	Dibenz(a,h) Anthracene	<0.041
HA-15	1	4/18/2012	Dibenz(a,h) Anthracene	<0.045
HA-16	1	4/18/2012	Dibenz(a,h) Anthracene	<0.045
HA-16	4.5	4/18/2012	Dibenz(a,h) Anthracene	<0.045
HA-18	1	4/18/2012	Dibenz(a,h) Anthracene	<0.045
B-4	2	1/22/2013	Dibenz(a,h) Anthracene	<0.082
B-5	2	1/22/2013	Dibenz(a,h) Anthracene	<0.082
N-3	2	1/22/2013	Dibenz(a,h) Anthracene	<0.083
W-1	2	1/22/2013	Dibenz(a,h) Anthracene	<0.083
HA-10	0	12/13/2010	Dibenz(a,h) Anthracene	<0.10
HA-11	0	12/13/2010	Dibenz(a,h) Anthracene	<0.10
HA-13	0	12/13/2010	Dibenz(a,h) Anthracene	<0.10
HA-9	0	12/13/2010	Dibenz(a,h) Anthracene	<0.10

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Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-1	2	1/22/2013	Dibenz(a,h) Anthracene	<0.16
N-1	2	1/22/2013	Dibenz(a,h) Anthracene	<0.16
HA-9	0	4/22/2013	Dibenz(a,h) Anthracene	<0.17
OX-2	3	2/21/2013	Dibenz(a,h) Anthracene	<0.17
OX-3	3	2/21/2013	Dibenz(a,h) Anthracene	<0.17
HA-14	0	4/18/2012	Dibenz(a,h) Anthracene	<0.18
HA-16	0	4/18/2012	Dibenz(a,h) Anthracene	<0.18
OX-1	3	2/21/2013	Dibenz(a,h) Anthracene	<0.33
HA-15	0	4/18/2012	Dibenz(a,h) Anthracene	<0.45
HA-17	0	4/18/2012	Dibenz(a,h) Anthracene	<0.45
HA-18	0	4/18/2012	Dibenz(a,h) Anthracene	<0.45
HA-10	0	4/22/2013	Dibenz(a,h) Anthracene	<0.84
HA-10	1	4/22/2013	Dibenz(a,h) Anthracene	<0.84
HA-12	0	4/22/2013	Dibenz(a,h) Anthracene	<4.2
HA-13	0	4/22/2013	Dibenz(a,h) Anthracene	<8.4
S-3	2	1/22/2013	Diethyl Phthalate	<0.056
S-1	2	1/22/2013	Diethyl Phthalate	<0.057
B-3	2	1/22/2013	Diethyl Phthalate	0.0595 b
S-2	2	1/22/2013	Diethyl Phthalate	0.0644 b
N-2	2	1/22/2013	Diethyl Phthalate	0.0756 b
B-2	2	1/22/2013	Diethyl Phthalate	0.0788 b
B-4	2	1/22/2013	Diethyl Phthalate	<0.11
B-5	2	1/22/2013	Diethyl Phthalate	<0.11
N-3	2	1/22/2013	Diethyl Phthalate	<0.11
W-1	2	1/22/2013	Diethyl Phthalate	<0.11
OX-2	3	2/21/2013	Diethyl Phthalate	<0.17
OX-3	3	2/21/2013	Diethyl Phthalate	<0.17
B-1	2	1/22/2013	Diethyl Phthalate	<0.23
N-1	2	1/22/2013	Diethyl Phthalate	<0.23
OX-1	3	2/21/2013	Diethyl Phthalate	<0.33
HA-10	0	4/22/2013	Diethyl Phthalate	<0.66
HA-10	1	4/22/2013	Diethyl Phthalate	<0.66
HA-9	0	4/22/2013	Diethyl Phthalate	<1.3
HA-12	0	4/22/2013	Diethyl Phthalate	<3.3
HA-13	0	4/22/2013	Diethyl Phthalate	<6.6
VP-9	4.5	7/23/2008	DIPE	<0.010
VP-9	4.5	7/23/2008	ETBE	<0.010
VP-8	4.5	5/29/2007	Ethylbenzene	0.00084
MW-13	10	3/24/2015	Ethylbenzene	<0.00099
MW-13	5	3/24/2015	Ethylbenzene	<0.00099
B-10	6	7/17/1996	Ethylbenzene	<0.0050
B-11	5	7/17/1996	Ethylbenzene	<0.0050
B-12	5.5	7/17/1996	Ethylbenzene	<0.0050
B-13	5.5	7/17/1996	Ethylbenzene	<0.0050
B-17	5	11/22/2000	Ethylbenzene	<0.0050
B-18	5	11/22/2000	Ethylbenzene	<0.0050
B-19	5	11/22/2000	Ethylbenzene	<0.0050
B-20	4.5	4/11/2002	Ethylbenzene	<0.005
B-21	3	4/11/2002	Ethylbenzene	<0.005

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Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-21	8	4/11/2002	Ethylbenzene	<0.005
B-22	3	4/11/2002	Ethylbenzene	<0.005
B-23	5	1/3/2006	Ethylbenzene	<0.0050 g
B-24	5	12/20/2010	Ethylbenzene	<0.0050
B-25	5	12/23/2010	Ethylbenzene	<0.0050
B-26	5	12/20/2010	Ethylbenzene	<0.0050
B-27	5	12/20/2010	Ethylbenzene	<0.0050
B-28	5	12/20/2010	Ethylbenzene	<0.0050
B-29	5	12/20/2010	Ethylbenzene	<0.0050
B-31	5	12/22/2010	Ethylbenzene	<0.0050
B-33	5	12/22/2010	Ethylbenzene	<0.0050
B-34	5	12/22/2010	Ethylbenzene	<0.0050
B-35	5	12/22/2010	Ethylbenzene	<0.0050
B-36	5	12/22/2010	Ethylbenzene	<0.0050
B-37	5	12/22/2010	Ethylbenzene	<0.0050
B-38	5	12/21/2010	Ethylbenzene	<0.0050
B-38	8.2	12/21/2010	Ethylbenzene	<0.0050
B-40	5	12/21/2010	Ethylbenzene	<0.0050
B-44	5	12/21/2010	Ethylbenzene	<0.0050
B-45	5	12/21/2010	Ethylbenzene	<0.0050
B-46	5	12/21/2010	Ethylbenzene	<0.0050
B-47	5	12/21/2010	Ethylbenzene	<0.0050
B-48	5	12/21/2010	Ethylbenzene	<0.0050
GP-1	4.5	8/31/2005	Ethylbenzene	<0.0050
GP-1	5	8/29/2005	Ethylbenzene	<0.0050
GP-4	4.5	8/31/2005	Ethylbenzene	<0.0050
GP-5	4.5	8/30/2005	Ethylbenzene	<0.0050
GP-6	5	8/29/2005	Ethylbenzene	<0.0050
GP-7	5	8/30/2005	Ethylbenzene	<0.0050
GP-8	4.5	8/30/2005	Ethylbenzene	<0.0050
GP-9	4.5	8/31/2005	Ethylbenzene	<0.0050
MW-10	5	8/10/2010	Ethylbenzene	<0.0050
MW-10	9.5	8/10/2010	Ethylbenzene	<0.0050
MW-11	5	8/10/2010	Ethylbenzene	<0.0050
MW-11	9.5	8/10/2010	Ethylbenzene	<0.0050
MW-12	10	2/28/2006	Ethylbenzene	<0.0050
MW-12	5	2/28/2006	Ethylbenzene	<0.0050
MW-14	5	2/28/2006	Ethylbenzene	<0.0050
MW-3	5	11/22/2000	Ethylbenzene	<0.0050
MW-4	5	11/22/2000	Ethylbenzene	<0.0050
MW-5	5	11/22/2000	Ethylbenzene	<0.0050
MW-7	5.5	1/4/2006	Ethylbenzene	<0.0050 g
MW-8	6.5	1/3/2006	Ethylbenzene	<0.0050 g
MW-9	5	8/10/2010	Ethylbenzene	<0.0050
MW-9	9.5	8/10/2010	Ethylbenzene	<0.0050
VP-7	4.5	6/6/2007	Ethylbenzene	<0.0050
VP-9	4.5	7/23/2008	Ethylbenzene	<0.0050
GP-2	4.5	8/29/2005	Ethylbenzene	0.0063
B-29	10	12/20/2010	Ethylbenzene	0.015

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Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-30	5	12/23/2010	Ethylbenzene	0.015
B-19	7	11/22/2000	Ethylbenzene	0.025
MW-6	5	1/4/2006	Ethylbenzene	0.025 g
MW-14	10	2/28/2006	Ethylbenzene	0.028
GP-3	5	8/29/2005	Ethylbenzene	0.085
B-18	7	11/22/2000	Ethylbenzene	0.094
B-8	10	5/23/1995	Ethylbenzene	0.1
B-20	7.5	4/11/2002	Ethylbenzene	0.14
B-7	10	5/23/1995	Ethylbenzene	0.2
B-4	6	5/23/1995	Ethylbenzene	0.4
B-32	5	12/22/2010	Ethylbenzene	<0.50
B-32	7	12/22/2010	Ethylbenzene	<0.50
B-39	5	12/21/2010	Ethylbenzene	<0.50
B-39	8.5	12/21/2010	Ethylbenzene	<0.50
B-41	5	12/20/2010	Ethylbenzene	<0.50
B-43	5	12/21/2010	Ethylbenzene	<0.50
B-45	10	12/21/2010	Ethylbenzene	<0.50
B-46	8.5	12/21/2010	Ethylbenzene	<0.50
B-47	10	12/21/2010	Ethylbenzene	<0.50
B-48	10	12/21/2010	Ethylbenzene	<0.50
GP-1	10	8/29/2005	Ethylbenzene	<0.50
B-31	10	12/22/2010	Ethylbenzene	0.77
B-3	6	5/23/1995	Ethylbenzene	0.9
B-6	5	5/23/1995	Ethylbenzene	1
B-7	5	5/23/1995	Ethylbenzene	1
V-2	5.5	7/19/1996	Ethylbenzene	1.2
B-34	10	12/22/2010	Ethylbenzene	1.7
GP-6	9.5	8/29/2005	Ethylbenzene	2.1
B-38	10	12/21/2010	Ethylbenzene	<2.5
B-46	10	12/21/2010	Ethylbenzene	<2.5
MW-6	10	1/4/2006	Ethylbenzene	3.1 i
B-24	10	12/20/2010	Ethylbenzene	3.6
B-32	10	12/22/2010	Ethylbenzene	4.1
B-36	10	12/22/2010	Ethylbenzene	4.2
B-35	10	12/22/2010	Ethylbenzene	4.3
B-2	5	5/23/1995	Ethylbenzene	4.7
B-42	5	12/20/2010	Ethylbenzene	5.5
B-22	8	4/11/2002	Ethylbenzene	6.1
B-6	10	5/23/1995	Ethylbenzene	7.3
B-28	10	12/20/2010	Ethylbenzene	7.4
GP-7	9.5	8/30/2005	Ethylbenzene	10
B-23	10	1/3/2006	Ethylbenzene	12 i
B-25	10	12/23/2010	Ethylbenzene	12
B-44	10	12/21/2010	Ethylbenzene	13
B-17	7	11/22/2000	Ethylbenzene	18
B-26	10	12/20/2010	Ethylbenzene	21
B-43	10	12/21/2010	Ethylbenzene	21
B-27	10	12/20/2010	Ethylbenzene	28
B-37	10	12/22/2010	Ethylbenzene	30

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Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-39	10	12/21/2010	Ethylbenzene	30
B-33	10	12/22/2010	Ethylbenzene	36
B-30	10	12/23/2010	Ethylbenzene	44
B-40	10	12/21/2010	Ethylbenzene	65
B-41	10	12/20/2010	Ethylbenzene	68
B-41	8.5	12/20/2010	Ethylbenzene	68
GP-3	8.5	8/29/2005	Ethylbenzene	91
B-42	10	12/20/2010	Ethylbenzene	270
HA-1	5	4/8/2009	Fluoranthene	<0.020
HA-10	4.5	12/13/2010	Fluoranthene	<0.020
HA-11	4.5	12/13/2010	Fluoranthene	<0.020
HA-12	4.5	12/13/2010	Fluoranthene	<0.020
HA-13	1	12/13/2010	Fluoranthene	<0.020
HA-13	4.5	12/13/2010	Fluoranthene	<0.020
HA-2	5	4/8/2009	Fluoranthene	<0.020
HA-3	5	4/8/2009	Fluoranthene	<0.020
HA-4	5	4/8/2009	Fluoranthene	<0.020
HA-5	5	4/8/2009	Fluoranthene	<0.020
HA-6	5	4/8/2009	Fluoranthene	<0.020
HA-7	5	4/8/2009	Fluoranthene	<0.020
HA-8	5	4/8/2009	Fluoranthene	<0.020
HA-9	4.5	12/13/2010	Fluoranthene	<0.020
HA-14	1	4/18/2012	Fluoranthene	<0.030
HA-14	4.5	4/18/2012	Fluoranthene	<0.030
HA-15	4.5	4/18/2012	Fluoranthene	<0.030
HA-17	1	4/18/2012	Fluoranthene	<0.030
HA-17	4.5	4/18/2012	Fluoranthene	<0.030
HA-18	4.5	4/18/2012	Fluoranthene	<0.030
B-2	2	1/22/2013	Fluoranthene	<0.033
B-3	2	1/22/2013	Fluoranthene	<0.033
N-2	2	1/22/2013	Fluoranthene	<0.033
S-1	2	1/22/2013	Fluoranthene	<0.033
S-2	2	1/22/2013	Fluoranthene	<0.033
S-3	2	1/22/2013	Fluoranthene	<0.033
HA-15	1	4/18/2012	Fluoranthene	<0.045
HA-16	1	4/18/2012	Fluoranthene	<0.045
HA-16	4.5	4/18/2012	Fluoranthene	<0.045
HA-18	1	4/18/2012	Fluoranthene	<0.045
HA-15	0	4/18/2012	Fluoranthene	0.054
B-4	2	1/22/2013	Fluoranthene	<0.066
W-1	2	1/22/2013	Fluoranthene	<0.067
HA-11	1	12/13/2010	Fluoranthene	0.074
HA-12	1	12/13/2010	Fluoranthene	0.086
N-3	2	1/22/2013	Fluoranthene	0.113 b
B-1	2	1/22/2013	Fluoranthene	<0.13
N-1	2	1/22/2013	Fluoranthene	<0.13
HA-9	1	12/13/2010	Fluoranthene	0.14
B-5	2	1/22/2013	Fluoranthene	0.151 b
HA-10	0	12/13/2010	Fluoranthene	0.17

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
OX-2	3	2/21/2013	Fluoranthene	<0.17
OX-3	3	2/21/2013	Fluoranthene	<0.17
HA-14	0	4/18/2012	Fluoranthene	<0.18
HA-16	0	4/18/2012	Fluoranthene	<0.18
HA-11	0	12/13/2010	Fluoranthene	0.19
HA-9	0	12/13/2010	Fluoranthene	0.19
HA-10	1	12/13/2010	Fluoranthene	0.2
OX-1	3	2/21/2013	Fluoranthene	<0.33
HA-13	0	12/13/2010	Fluoranthene	0.38
HA-12	0	12/13/2010	Fluoranthene	0.41
HA-17	0	4/18/2012	Fluoranthene	<0.45
HA-18	0	4/18/2012	Fluoranthene	<0.45
HA-10	1	4/22/2013	Fluoranthene	<0.66
HA-9	0	4/22/2013	Fluoranthene	<1.3
HA-10	0	4/22/2013	Fluoranthene	1.4
HA-12	0	4/22/2013	Fluoranthene	<3.3
HA-13	0	4/22/2013	Fluoranthene	<6.6
HA-1	5	4/8/2009	Fluorene	<0.020
HA-10	1	12/13/2010	Fluorene	<0.020
HA-10	4.5	12/13/2010	Fluorene	<0.020
HA-11	1	12/13/2010	Fluorene	<0.020
HA-11	4.5	12/13/2010	Fluorene	<0.020
HA-12	0	12/13/2010	Fluorene	<0.020
HA-12	1	12/13/2010	Fluorene	<0.020
HA-12	4.5	12/13/2010	Fluorene	<0.020
HA-13	1	12/13/2010	Fluorene	<0.020
HA-13	4.5	12/13/2010	Fluorene	<0.020
HA-2	5	4/8/2009	Fluorene	<0.020
HA-3	5	4/8/2009	Fluorene	<0.020
HA-4	5	4/8/2009	Fluorene	<0.020
HA-5	5	4/8/2009	Fluorene	<0.020
HA-6	5	4/8/2009	Fluorene	<0.020
HA-7	5	4/8/2009	Fluorene	<0.020
HA-8	5	4/8/2009	Fluorene	<0.020
HA-9	1	12/13/2010	Fluorene	<0.020
HA-9	4.5	12/13/2010	Fluorene	<0.020
HA-14	1	4/18/2012	Fluorene	<0.030
HA-14	4.5	4/18/2012	Fluorene	<0.030
HA-15	4.5	4/18/2012	Fluorene	<0.030
HA-17	1	4/18/2012	Fluorene	<0.030
HA-17	4.5	4/18/2012	Fluorene	<0.030
HA-18	4.5	4/18/2012	Fluorene	<0.030
HA-15	1	4/18/2012	Fluorene	<0.045
HA-16	1	4/18/2012	Fluorene	<0.045
HA-16	4.5	4/18/2012	Fluorene	<0.045
HA-18	1	4/18/2012	Fluorene	<0.045
B-2	2	1/22/2013	Fluorene	<0.072
B-3	2	1/22/2013	Fluorene	<0.072
N-2	2	1/22/2013	Fluorene	<0.072

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
S-1	2	1/22/2013	Fluorene	<0.072
S-2	2	1/22/2013	Fluorene	<0.072
S-3	2	1/22/2013	Fluorene	<0.072
HA-10	0	12/13/2010	Fluorene	<0.10
HA-11	0	12/13/2010	Fluorene	<0.10
HA-13	0	12/13/2010	Fluorene	<0.10
HA-9	0	12/13/2010	Fluorene	<0.10
B-4	2	1/22/2013	Fluorene	<0.14
B-5	2	1/22/2013	Fluorene	<0.14
N-3	2	1/22/2013	Fluorene	<0.14
W-1	2	1/22/2013	Fluorene	<0.14
OX-2	3	2/21/2013	Fluorene	<0.17
OX-3	3	2/21/2013	Fluorene	<0.17
HA-14	0	4/18/2012	Fluorene	<0.18
HA-16	0	4/18/2012	Fluorene	<0.18
B-1	2	1/22/2013	Fluorene	<0.29
N-1	2	1/22/2013	Fluorene	<0.29
OX-1	3	2/21/2013	Fluorene	<0.33
HA-15	0	4/18/2012	Fluorene	<0.45
HA-17	0	4/18/2012	Fluorene	<0.45
HA-18	0	4/18/2012	Fluorene	<0.45
HA-10	0	4/22/2013	Fluorene	<0.66
HA-10	1	4/22/2013	Fluorene	<0.66
HA-9	0	4/22/2013	Fluorene	<1.3
HA-12	0	4/22/2013	Fluorene	<3.3
HA-13	0	4/22/2013	Fluorene	<6.6
HA-1	5	4/8/2009	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-10	4.5	12/13/2010	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-11	1	12/13/2010	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-11	4.5	12/13/2010	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-12	4.5	12/13/2010	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-13	1	12/13/2010	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-13	4.5	12/13/2010	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-2	5	4/8/2009	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-3	5	4/8/2009	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-4	5	4/8/2009	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-5	5	4/8/2009	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-6	5	4/8/2009	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-7	5	4/8/2009	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-8	5	4/8/2009	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-9	4.5	12/13/2010	Indeno(1,2,3-c,d) Pyrene	<0.020
HA-12	1	12/13/2010	Indeno(1,2,3-c,d) Pyrene	0.025
HA-14	1	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.030
HA-14	4.5	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.030
HA-15	4.5	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.030
HA-17	1	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.030
HA-17	4.5	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.030
HA-18	4.5	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.030
B-3	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.042

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
N-2	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.042
S-2	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.042
S-3	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.042
B-2	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.043
S-1	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.043
HA-9	1	12/13/2010	Indeno(1,2,3-c,d) Pyrene	0.044
HA-15	1	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.045
HA-16	1	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.045
HA-16	4.5	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.045
HA-18	1	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.045
B-4	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.085
B-5	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.085
N-3	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.085
W-1	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.085
HA-10	1	12/13/2010	Indeno(1,2,3-c,d) Pyrene	0.1
HA-9	0	12/13/2010	Indeno(1,2,3-c,d) Pyrene	0.1
HA-11	0	12/13/2010	Indeno(1,2,3-c,d) Pyrene	0.12
HA-10	0	12/13/2010	Indeno(1,2,3-c,d) Pyrene	0.14
HA-12	0	12/13/2010	Indeno(1,2,3-c,d) Pyrene	0.15
HA-13	0	12/13/2010	Indeno(1,2,3-c,d) Pyrene	0.15
B-1	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.17
N-1	2	1/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.17
OX-2	3	2/21/2013	Indeno(1,2,3-c,d) Pyrene	<0.17
OX-3	3	2/21/2013	Indeno(1,2,3-c,d) Pyrene	<0.17
HA-14	0	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.18
HA-16	0	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.18
OX-1	3	2/21/2013	Indeno(1,2,3-c,d) Pyrene	<0.33
HA-15	0	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.45
HA-17	0	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.45
HA-18	0	4/18/2012	Indeno(1,2,3-c,d) Pyrene	<0.45
HA-10	1	4/22/2013	Indeno(1,2,3-c,d) Pyrene	<0.66
HA-9	0	4/22/2013	Indeno(1,2,3-c,d) Pyrene	<1.3
HA-10	0	4/22/2013	Indeno(1,2,3-c,d) Pyrene	1.7
HA-12	0	4/22/2013	Indeno(1,2,3-c,d) Pyrene	<3.3
HA-13	0	4/22/2013	Indeno(1,2,3-c,d) Pyrene	<6.6
B-23	10	1/3/2006	Lead	5.4
HA-9	4.5	12/13/2010	Lead	5.53
HA-4	5	4/8/2009	Lead	5.81
HA-15	4.5	4/18/2012	Lead	6.4
OX-3	3	2/21/2013	Lead	6.4
HA-3	5	4/8/2009	Lead	6.65
B-2	2	1/22/2013	Lead	6.8
B-3	2	1/22/2013	Lead	7.3
HA-10	4.5	12/13/2010	Lead	7.39
HA-7	5	4/8/2009	Lead	7.45
S-1	2	1/22/2013	Lead	7.6
HA-14	4.5	4/18/2012	Lead	7.7
HA-1	5	4/8/2009	Lead	7.74
HA-5	5	4/8/2009	Lead	7.85

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-23	5	1/3/2006	Lead	9.1
HA-12	4.5	12/13/2010	Lead	9.25
S-3	2	1/22/2013	Lead	9.4
HA-18	4.5	4/18/2012	Lead	11
MW-7	5.5	1/4/2006	Lead	11
VP-14	0	3/24/2015	Lead	11
OX-2	3	2/21/2013	Lead	11.5
HA-6	5	4/8/2009	Lead	12.1
OX-1	3	2/21/2013	Lead	13
S-2	2	1/22/2013	Lead	13.3
HA-17	4.5	4/18/2012	Lead	14
MW-6	10	1/4/2006	Lead	14
MW-6	5	1/4/2006	Lead	17
HA-2	5	4/8/2009	Lead	19.4
HA-8	5	4/8/2009	Lead	19.7
HA-17	1	4/18/2012	Lead	38
HA-15	1	4/18/2012	Lead	40
W-1	2	1/22/2013	Lead	41.8
N-2	2	1/22/2013	Lead	48.8
B-1	2	1/22/2013	Lead	55.9
HA-11	4.5	12/13/2010	Lead	73.2
B-5	2	1/22/2013	Lead	83.8
HA-14	1	4/18/2012	Lead	87
B-4	2	1/22/2013	Lead	97.3
HA-16	4.5	4/18/2012	Lead	150
HA-11	1	12/13/2010	Lead	166
HA-20	0	4/22/2013	Lead	170
MW-13	0	3/24/2015	Lead	190
HA-16	1	4/18/2012	Lead	220
VP-13	0	3/24/2015	Lead	270
HA-13	1	12/13/2010	Lead	291
N-1	2	1/22/2013	Lead	306
MW-8	6.5	1/3/2006	Lead	310
VP-12	0	3/24/2015	Lead	310
HA-21	0	4/22/2013	Lead	350
HA-9	1	12/13/2010	Lead	357
HA-18	1	4/18/2012	Lead	410
HA-13	4.5	12/13/2010	Lead	498
HA-10	1	12/13/2010	Lead	529
N-3	2	1/22/2013	Lead	721
HA-18	0	4/18/2012	Lead	1000
HA-16	0	4/18/2012	Lead	1100
HA-12	1	12/13/2010	Lead	1150
HA-23	0	4/22/2013	Lead	1200
HA-24	0	4/22/2013	Lead	1200
HA-10	0	12/13/2010	Lead	1240
HA-22	0	4/22/2013	Lead	1300
HA-15	0	4/18/2012	Lead	1400
HA-9	0	12/13/2010	Lead	1410

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-14	0	4/18/2012	Lead	1800
HA-11	0	12/13/2010	Lead	1950
HA-13	0	12/13/2010	Lead	3940
HA-17	0	4/18/2012	Lead	4200
HA-12	0	12/13/2010	Lead	4550
HA-19	0	4/22/2013	Lead	10000
B-17	5	11/22/2000	MTBE	<0.0050
B-18	5	11/22/2000	MTBE	<0.0050
B-19	5	11/22/2000	MTBE	<0.0050
B-19	7	11/22/2000	MTBE	<0.0050
MW-14	10	2/28/2006	MTBE	<0.0050
MW-3	5	11/22/2000	MTBE	<0.0050
MW-4	5	11/22/2000	MTBE	<0.0050
MW-5	5	11/22/2000	MTBE	<0.0050
VP-9	4.5	7/23/2008	MTBE	<0.0050
B-18	7	11/22/2000	MTBE	0.007
B-10	6	7/17/1996	MTBE	<0.025
B-11	5	7/17/1996	MTBE	<0.025
B-12	5.5	7/17/1996	MTBE	<0.025
B-13	5.5	7/17/1996	MTBE	<0.025
B-17	7	11/22/2000	MTBE	<0.050
B-20	4.5	4/11/2002	MTBE	<0.5
B-20	7.5	4/11/2002	MTBE	<0.5
B-21	3	4/11/2002	MTBE	<0.5
B-21	8	4/11/2002	MTBE	<0.5
B-22	3	4/11/2002	MTBE	<0.5
B-22	8	4/11/2002	MTBE	<0.5
V-2	5.5	7/19/1996	MTBE	7.7
HA-1	5	4/8/2009	Naphthalene	<0.020
HA-10	4.5	12/13/2010	Naphthalene	<0.020
HA-10	1	12/13/2010	Naphthalene	0.02
HA-11	1	12/13/2010	Naphthalene	<0.020
HA-11	4.5	12/13/2010	Naphthalene	<0.020
HA-12	1	12/13/2010	Naphthalene	<0.020
HA-12	4.5	12/13/2010	Naphthalene	<0.020
HA-13	1	12/13/2010	Naphthalene	<0.020
HA-13	4.5	12/13/2010	Naphthalene	<0.020
HA-2	5	4/8/2009	Naphthalene	<0.020
HA-3	5	4/8/2009	Naphthalene	<0.020
HA-4	5	4/8/2009	Naphthalene	<0.020
HA-5	5	4/8/2009	Naphthalene	<0.020
HA-6	5	4/8/2009	Naphthalene	<0.020
HA-7	5	4/8/2009	Naphthalene	<0.020
HA-8	5	4/8/2009	Naphthalene	<0.020
HA-9	1	12/13/2010	Naphthalene	<0.020
HA-9	4.5	12/13/2010	Naphthalene	<0.020
HA-14	1	4/18/2012	Naphthalene	<0.030
HA-14	4.5	4/18/2012	Naphthalene	<0.030
HA-15	4.5	4/18/2012	Naphthalene	<0.030

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-17	1	4/18/2012	Naphthalene	<0.030
HA-17	4.5	4/18/2012	Naphthalene	<0.030
HA-18	4.5	4/18/2012	Naphthalene	<0.030
HA-15	1	4/18/2012	Naphthalene	<0.045
HA-16	1	4/18/2012	Naphthalene	<0.045
HA-16	4.5	4/18/2012	Naphthalene	<0.045
HA-18	1	4/18/2012	Naphthalene	<0.045
HA-12	0	12/13/2010	Naphthalene	0.059
B-2	2	1/22/2013	Naphthalene	<0.077
B-3	2	1/22/2013	Naphthalene	<0.077
N-2	2	1/22/2013	Naphthalene	<0.077
S-1	2	1/22/2013	Naphthalene	<0.077
S-2	2	1/22/2013	Naphthalene	<0.077
S-3	2	1/22/2013	Naphthalene	<0.077
W-1	2	1/22/2013	Naphthalene	<0.077
HA-10	0	12/13/2010	Naphthalene	<0.10
HA-11	0	12/13/2010	Naphthalene	<0.10
HA-13	0	12/13/2010	Naphthalene	<0.10
HA-9	0	12/13/2010	Naphthalene	<0.10
B-4	2	1/22/2013	Naphthalene	<0.15
B-5	2	1/22/2013	Naphthalene	<0.15
N-3	2	1/22/2013	Naphthalene	<0.15
OX-2	3	2/21/2013	Naphthalene	<0.17
OX-3	3	2/21/2013	Naphthalene	<0.17
HA-14	0	4/18/2012	Naphthalene	<0.18
HA-16	0	4/18/2012	Naphthalene	<0.18
B-1	2	1/22/2013	Naphthalene	<0.31
N-1	2	1/22/2013	Naphthalene	<0.31
OX-1	3	2/21/2013	Naphthalene	<0.33
HA-15	0	4/18/2012	Naphthalene	<0.45
HA-17	0	4/18/2012	Naphthalene	<0.45
HA-18	0	4/18/2012	Naphthalene	<0.45
HA-10	0	4/22/2013	Naphthalene	<0.66
HA-10	1	4/22/2013	Naphthalene	<0.66
HA-9	0	4/22/2013	Naphthalene	<1.3
HA-12	0	4/22/2013	Naphthalene	<3.3
HA-13	0	4/22/2013	Naphthalene	<6.6
HA-1	5	4/8/2009	Phenanthrene	<0.020
HA-10	4.5	12/13/2010	Phenanthrene	<0.020
HA-11	4.5	12/13/2010	Phenanthrene	<0.020
HA-12	4.5	12/13/2010	Phenanthrene	<0.020
HA-13	1	12/13/2010	Phenanthrene	<0.020
HA-13	4.5	12/13/2010	Phenanthrene	<0.020
HA-2	5	4/8/2009	Phenanthrene	<0.020
HA-3	5	4/8/2009	Phenanthrene	<0.020
HA-4	5	4/8/2009	Phenanthrene	<0.020
HA-5	5	4/8/2009	Phenanthrene	<0.020
HA-6	5	4/8/2009	Phenanthrene	<0.020
HA-7	5	4/8/2009	Phenanthrene	<0.020

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-8	5	4/8/2009	Phenanthrene	<0.020
HA-9	4.5	12/13/2010	Phenanthrene	<0.020
HA-14	1	4/18/2012	Phenanthrene	<0.030
HA-14	4.5	4/18/2012	Phenanthrene	<0.030
HA-15	4.5	4/18/2012	Phenanthrene	<0.030
HA-17	1	4/18/2012	Phenanthrene	<0.030
HA-17	4.5	4/18/2012	Phenanthrene	<0.030
HA-18	4.5	4/18/2012	Phenanthrene	<0.030
HA-15	1	4/18/2012	Phenanthrene	<0.045
HA-16	1	4/18/2012	Phenanthrene	<0.045
HA-16	4.5	4/18/2012	Phenanthrene	<0.045
HA-18	1	4/18/2012	Phenanthrene	<0.045
HA-11	1	12/13/2010	Phenanthrene	0.048
B-2	2	1/22/2013	Phenanthrene	<0.058
B-3	2	1/22/2013	Phenanthrene	<0.058
N-2	2	1/22/2013	Phenanthrene	<0.058
S-1	2	1/22/2013	Phenanthrene	<0.058
S-2	2	1/22/2013	Phenanthrene	<0.058
S-3	2	1/22/2013	Phenanthrene	<0.058
HA-12	1	12/13/2010	Phenanthrene	0.089
HA-9	1	12/13/2010	Phenanthrene	0.091
HA-10	1	12/13/2010	Phenanthrene	0.098
HA-11	0	12/13/2010	Phenanthrene	<0.10
HA-10	0	12/13/2010	Phenanthrene	0.11
B-4	2	1/22/2013	Phenanthrene	<0.12
B-5	2	1/22/2013	Phenanthrene	<0.12
HA-9	0	12/13/2010	Phenanthrene	0.12
N-3	2	1/22/2013	Phenanthrene	<0.12
W-1	2	1/22/2013	Phenanthrene	<0.12
OX-2	3	2/21/2013	Phenanthrene	<0.17
OX-3	3	2/21/2013	Phenanthrene	<0.17
HA-14	0	4/18/2012	Phenanthrene	<0.18
HA-16	0	4/18/2012	Phenanthrene	0.19
B-1	2	1/22/2013	Phenanthrene	<0.23
N-1	2	1/22/2013	Phenanthrene	<0.23
HA-12	0	12/13/2010	Phenanthrene	0.26
HA-13	0	12/13/2010	Phenanthrene	0.26
OX-1	3	2/21/2013	Phenanthrene	<0.33
HA-15	0	4/18/2012	Phenanthrene	<0.45
HA-17	0	4/18/2012	Phenanthrene	<0.45
HA-18	0	4/18/2012	Phenanthrene	<0.45
HA-10	0	4/22/2013	Phenanthrene	<0.66
HA-10	1	4/22/2013	Phenanthrene	<0.66
HA-9	0	4/22/2013	Phenanthrene	<1.3
HA-12	0	4/22/2013	Phenanthrene	<3.3
HA-13	0	4/22/2013	Phenanthrene	<6.6
HA-1	5	4/8/2009	Pyrene	<0.020
HA-10	4.5	12/13/2010	Pyrene	<0.020
HA-11	4.5	12/13/2010	Pyrene	<0.020

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-12	4.5	12/13/2010	Pyrene	<0.020
HA-13	1	12/13/2010	Pyrene	<0.020
HA-13	4.5	12/13/2010	Pyrene	<0.020
HA-2	5	4/8/2009	Pyrene	<0.020
HA-3	5	4/8/2009	Pyrene	<0.020
HA-4	5	4/8/2009	Pyrene	<0.020
HA-5	5	4/8/2009	Pyrene	<0.020
HA-6	5	4/8/2009	Pyrene	<0.020
HA-7	5	4/8/2009	Pyrene	<0.020
HA-8	5	4/8/2009	Pyrene	<0.020
HA-9	4.5	12/13/2010	Pyrene	<0.020
HA-14	1	4/18/2012	Pyrene	<0.030
HA-14	4.5	4/18/2012	Pyrene	<0.030
HA-15	4.5	4/18/2012	Pyrene	<0.030
HA-17	1	4/18/2012	Pyrene	<0.030
HA-17	4.5	4/18/2012	Pyrene	<0.030
HA-18	4.5	4/18/2012	Pyrene	<0.030
B-2	2	1/22/2013	Pyrene	<0.033
B-3	2	1/22/2013	Pyrene	<0.033
N-2	2	1/22/2013	Pyrene	<0.033
S-1	2	1/22/2013	Pyrene	<0.033
S-2	2	1/22/2013	Pyrene	<0.033
S-3	2	1/22/2013	Pyrene	<0.033
HA-15	1	4/18/2012	Pyrene	<0.045
HA-16	1	4/18/2012	Pyrene	<0.045
HA-16	4.5	4/18/2012	Pyrene	<0.045
HA-18	1	4/18/2012	Pyrene	<0.045
B-4	2	1/22/2013	Pyrene	<0.066
W-1	2	1/22/2013	Pyrene	<0.067
HA-11	1	12/13/2010	Pyrene	0.07
HA-15	0	4/18/2012	Pyrene	0.08
HA-12	1	12/13/2010	Pyrene	0.088
B-1	2	1/22/2013	Pyrene	<0.13
N-1	2	1/22/2013	Pyrene	<0.13
N-3	2	1/22/2013	Pyrene	0.136 b
HA-9	1	12/13/2010	Pyrene	0.14
B-5	2	1/22/2013	Pyrene	0.158 b
OX-2	3	2/21/2013	Pyrene	<0.17
OX-3	3	2/21/2013	Pyrene	<0.17
HA-10	0	12/13/2010	Pyrene	0.22
HA-9	0	12/13/2010	Pyrene	0.23
HA-10	1	12/13/2010	Pyrene	0.24
HA-16	0	4/18/2012	Pyrene	0.26
HA-11	0	12/13/2010	Pyrene	0.27
HA-14	0	4/18/2012	Pyrene	0.27
OX-1	3	2/21/2013	Pyrene	<0.33
HA-13	0	12/13/2010	Pyrene	0.42
HA-17	0	4/18/2012	Pyrene	<0.45
HA-18	0	4/18/2012	Pyrene	<0.45

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-12	0	12/13/2010	Pyrene	0.55
HA-10	1	4/22/2013	Pyrene	<0.66
HA-9	0	4/22/2013	Pyrene	<1.3
HA-10	0	4/22/2013	Pyrene	1.6
HA-12	0	4/22/2013	Pyrene	<3.3
HA-13	0	4/22/2013	Pyrene	<6.6
VP-9	4.5	7/23/2008	TAME	<0.010
B-17	5	11/22/2000	TBA	<0.0050
B-18	5	11/22/2000	TBA	<0.0050
B-19	5	11/22/2000	TBA	<0.0050
MW-3	5	11/22/2000	TBA	<0.0050
MW-4	5	11/22/2000	TBA	<0.0050
MW-5	5	11/22/2000	TBA	<0.0050
B-19	7	11/22/2000	TBA	<0.020
MW-14	10	2/28/2006	TBA	<0.025
B-17	7	11/22/2000	TBA	<0.050
B-18	7	11/22/2000	TBA	<0.050
VP-9	4.5	7/23/2008	TBA	<0.050
VP-8	4.5	5/29/2007	Toluene	0.00084
MW-13	10	3/24/2015	Toluene	<0.00099
MW-13	5	3/24/2015	Toluene	<0.00099
B-10	6	7/17/1996	Toluene	<0.0050
B-11	5	7/17/1996	Toluene	<0.0050
B-12	5.5	7/17/1996	Toluene	<0.0050
B-13	5.5	7/17/1996	Toluene	<0.0050
B-17	5	11/22/2000	Toluene	<0.0050
B-18	5	11/22/2000	Toluene	<0.0050
B-18	7	11/22/2000	Toluene	<0.0050
B-19	5	11/22/2000	Toluene	<0.0050
B-19	7	11/22/2000	Toluene	<0.0050
B-20	4.5	4/11/2002	Toluene	<0.005
B-20	7.5	4/11/2002	Toluene	<0.005
B-21	3	4/11/2002	Toluene	<0.005
B-21	8	4/11/2002	Toluene	<0.005
B-22	3	4/11/2002	Toluene	<0.005
B-23	5	1/3/2006	Toluene	<0.0050 g
B-24	5	12/20/2010	Toluene	<0.0050
B-25	5	12/23/2010	Toluene	<0.0050
B-26	5	12/20/2010	Toluene	<0.0050
B-27	5	12/20/2010	Toluene	<0.0050
B-28	5	12/20/2010	Toluene	<0.0050
B-29	10	12/20/2010	Toluene	<0.0050
B-29	5	12/20/2010	Toluene	<0.0050
B-30	5	12/23/2010	Toluene	<0.0050
B-31	5	12/22/2010	Toluene	<0.0050
B-33	5	12/22/2010	Toluene	<0.0050
B-34	5	12/22/2010	Toluene	<0.0050
B-35	5	12/22/2010	Toluene	<0.0050
B-36	5	12/22/2010	Toluene	<0.0050

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-37	5	12/22/2010	Toluene	<0.0050
B-38	5	12/21/2010	Toluene	<0.0050
B-38	8.2	12/21/2010	Toluene	<0.0050
B-40	5	12/21/2010	Toluene	<0.0050
B-44	5	12/21/2010	Toluene	<0.0050
B-45	5	12/21/2010	Toluene	<0.0050
B-46	5	12/21/2010	Toluene	<0.0050
B-47	5	12/21/2010	Toluene	<0.0050
B-48	5	12/21/2010	Toluene	<0.0050
GP-1	4.5	8/31/2005	Toluene	<0.0050
GP-1	5	8/29/2005	Toluene	<0.0050
GP-2	4.5	8/29/2005	Toluene	<0.0050
GP-3	5	8/29/2005	Toluene	<0.0050
GP-4	4.5	8/31/2005	Toluene	<0.0050
GP-5	4.5	8/30/2005	Toluene	<0.0050
GP-6	5	8/29/2005	Toluene	<0.0050
GP-7	5	8/30/2005	Toluene	<0.0050
GP-8	4.5	8/30/2005	Toluene	<0.0050
GP-9	4.5	8/31/2005	Toluene	<0.0050
MW-10	5	8/10/2010	Toluene	<0.0050
MW-10	9.5	8/10/2010	Toluene	<0.0050
MW-11	5	8/10/2010	Toluene	<0.0050
MW-11	9.5	8/10/2010	Toluene	<0.0050
MW-12	10	2/28/2006	Toluene	<0.0050
MW-12	5	2/28/2006	Toluene	<0.0050
MW-14	10	2/28/2006	Toluene	<0.0050
MW-14	5	2/28/2006	Toluene	<0.0050
MW-3	5	11/22/2000	Toluene	<0.0050
MW-4	5	11/22/2000	Toluene	<0.0050
MW-5	5	11/22/2000	Toluene	<0.0050
MW-7	5.5	1/4/2006	Toluene	<0.0050 g
MW-8	6.5	1/3/2006	Toluene	<0.0050 g
MW-9	5	8/10/2010	Toluene	<0.0050
MW-9	9.5	8/10/2010	Toluene	<0.0050
VP-7	4.5	6/6/2007	Toluene	<0.0050
VP-9	4.5	7/23/2008	Toluene	<0.0050
MW-6	5	1/4/2006	Toluene	<0.025 g
B-2	5	5/23/1995	Toluene	<0.1
B-3	6	5/23/1995	Toluene	<0.1
B-4	6	5/23/1995	Toluene	<0.1
B-6	10	5/23/1995	Toluene	<0.1
B-6	5	5/23/1995	Toluene	<0.1
B-7	10	5/23/1995	Toluene	<0.1
B-7	5	5/23/1995	Toluene	<0.1
B-8	10	5/23/1995	Toluene	<0.1
V-2	5.5	7/19/1996	Toluene	<0.12
B-22	8	4/11/2002	Toluene	0.27
B-24	10	12/20/2010	Toluene	<0.50
B-26	10	12/20/2010	Toluene	<0.50

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-28	10	12/20/2010	Toluene	<0.50
B-31	10	12/22/2010	Toluene	<0.50
B-32	5	12/22/2010	Toluene	<0.50
B-32	7	12/22/2010	Toluene	<0.50
B-34	10	12/22/2010	Toluene	<0.50
B-35	10	12/22/2010	Toluene	<0.50
B-36	10	12/22/2010	Toluene	<0.50
B-39	5	12/21/2010	Toluene	<0.50
B-39	8.5	12/21/2010	Toluene	<0.50
B-41	5	12/20/2010	Toluene	<0.50
B-43	5	12/21/2010	Toluene	<0.50
B-45	10	12/21/2010	Toluene	<0.50
B-46	8.5	12/21/2010	Toluene	<0.50
B-47	10	12/21/2010	Toluene	<0.50
B-48	10	12/21/2010	Toluene	<0.50
GP-1	10	8/29/2005	Toluene	<0.50
GP-6	9.5	8/29/2005	Toluene	<0.50
B-17	7	11/22/2000	Toluene	0.64
MW-6	10	1/4/2006	Toluene	<1.2 i
GP-7	9.5	8/30/2005	Toluene	1.8
B-25	10	12/23/2010	Toluene	<2.5
B-32	10	12/22/2010	Toluene	<2.5
B-33	10	12/22/2010	Toluene	<2.5
B-37	10	12/22/2010	Toluene	<2.5
B-38	10	12/21/2010	Toluene	<2.5
B-39	10	12/21/2010	Toluene	<2.5
B-43	10	12/21/2010	Toluene	<2.5
B-44	10	12/21/2010	Toluene	<2.5
B-46	10	12/21/2010	Toluene	<2.5
GP-3	8.5	8/29/2005	Toluene	2.7
B-30	10	12/23/2010	Toluene	3
B-42	5	12/20/2010	Toluene	<5.0
B-23	10	1/3/2006	Toluene	<6.2 i
B-27	10	12/20/2010	Toluene	10
B-41	10	12/20/2010	Toluene	<10
B-41	8.5	12/20/2010	Toluene	<10
B-40	10	12/21/2010	Toluene	63
B-42	10	12/20/2010	Toluene	320
VP-8	4.5	5/29/2007	Total Xylenes	0.0015
MW-13	10	3/24/2015	Total Xylenes	<0.0020
MW-13	5	3/24/2015	Total Xylenes	<0.0020
B-11	5	7/17/1996	Total Xylenes	<0.0050
B-12	5.5	7/17/1996	Total Xylenes	<0.0050
B-13	5.5	7/17/1996	Total Xylenes	<0.0050
B-17	5	11/22/2000	Total Xylenes	<0.0050
B-18	5	11/22/2000	Total Xylenes	<0.0050
B-18	7	11/22/2000	Total Xylenes	<0.0050
B-19	5	11/22/2000	Total Xylenes	<0.0050
B-20	4.5	4/11/2002	Total Xylenes	<0.005

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-21	3	4/11/2002	Total Xylenes	<0.005
B-21	8	4/11/2002	Total Xylenes	<0.005
B-22	3	4/11/2002	Total Xylenes	<0.005
B-23	5	1/3/2006	Total Xylenes	<0.0050 g
B-24	5	12/20/2010	Total Xylenes	<0.0050
B-25	5	12/23/2010	Total Xylenes	<0.0050
B-26	5	12/20/2010	Total Xylenes	<0.0050
B-27	5	12/20/2010	Total Xylenes	<0.0050
B-28	5	12/20/2010	Total Xylenes	<0.0050
B-29	5	12/20/2010	Total Xylenes	<0.0050
B-31	5	12/22/2010	Total Xylenes	<0.0050
B-33	5	12/22/2010	Total Xylenes	<0.0050
B-34	5	12/22/2010	Total Xylenes	<0.0050
B-35	5	12/22/2010	Total Xylenes	<0.0050
B-36	5	12/22/2010	Total Xylenes	<0.0050
B-37	5	12/22/2010	Total Xylenes	<0.0050
B-38	5	12/21/2010	Total Xylenes	<0.0050
B-38	8.2	12/21/2010	Total Xylenes	<0.0050
B-40	5	12/21/2010	Total Xylenes	<0.0050
B-44	5	12/21/2010	Total Xylenes	<0.0050
B-45	5	12/21/2010	Total Xylenes	<0.0050
B-46	5	12/21/2010	Total Xylenes	<0.0050
B-47	5	12/21/2010	Total Xylenes	<0.0050
B-48	5	12/21/2010	Total Xylenes	<0.0050
GP-1	4.5	8/31/2005	Total Xylenes	<0.0050
GP-1	5	8/29/2005	Total Xylenes	<0.0050
GP-2	4.5	8/29/2005	Total Xylenes	<0.0050
GP-4	4.5	8/31/2005	Total Xylenes	<0.0050
GP-5	4.5	8/30/2005	Total Xylenes	<0.0050
GP-6	5	8/29/2005	Total Xylenes	<0.0050
GP-7	5	8/30/2005	Total Xylenes	<0.0050
GP-8	4.5	8/30/2005	Total Xylenes	<0.0050
GP-9	4.5	8/31/2005	Total Xylenes	<0.0050
MW-10	5	8/10/2010	Total Xylenes	<0.0050
MW-10	9.5	8/10/2010	Total Xylenes	<0.0050
MW-11	5	8/10/2010	Total Xylenes	<0.0050
MW-11	9.5	8/10/2010	Total Xylenes	<0.0050
MW-12	10	2/28/2006	Total Xylenes	<0.0050
MW-12	5	2/28/2006	Total Xylenes	<0.0050
MW-14	5	2/28/2006	Total Xylenes	<0.0050
MW-3	5	11/22/2000	Total Xylenes	<0.0050
MW-4	5	11/22/2000	Total Xylenes	<0.0050
MW-5	5	11/22/2000	Total Xylenes	<0.0050
MW-8	6.5	1/3/2006	Total Xylenes	<0.0050 g
MW-9	5	8/10/2010	Total Xylenes	<0.0050
MW-9	9.5	8/10/2010	Total Xylenes	<0.0050
MW-14	10	2/28/2006	Total Xylenes	0.0055
B-10	6	7/17/1996	Total Xylenes	0.0058
B-30	5	12/23/2010	Total Xylenes	0.0087

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
VP-7	4.5	6/6/2007	Total Xylenes	<0.010
VP-9	4.5	7/23/2008	Total Xylenes	<0.010
B-29	10	12/20/2010	Total Xylenes	0.012
MW-7	5.5	1/4/2006	Total Xylenes	0.013 g
B-19	7	11/22/2000	Total Xylenes	0.023
B-20	7.5	4/11/2002	Total Xylenes	0.027
MW-6	5	1/4/2006	Total Xylenes	0.044 g
B-8	10	5/23/1995	Total Xylenes	<0.1
GP-3	5	8/29/2005	Total Xylenes	0.11
V-2	5.5	7/19/1996	Total Xylenes	<0.12
B-4	6	5/23/1995	Total Xylenes	0.2
B-7	10	5/23/1995	Total Xylenes	0.3
B-3	6	5/23/1995	Total Xylenes	0.4
B-32	5	12/22/2010	Total Xylenes	<0.50
B-32	7	12/22/2010	Total Xylenes	<0.50
B-34	10	12/22/2010	Total Xylenes	<0.50
B-39	5	12/21/2010	Total Xylenes	<0.50
B-39	8.5	12/21/2010	Total Xylenes	<0.50
B-41	5	12/20/2010	Total Xylenes	<0.50
B-43	5	12/21/2010	Total Xylenes	<0.50
B-45	10	12/21/2010	Total Xylenes	<0.50
B-46	8.5	12/21/2010	Total Xylenes	<0.50
B-47	10	12/21/2010	Total Xylenes	<0.50
B-48	10	12/21/2010	Total Xylenes	<0.50
GP-1	10	8/29/2005	Total Xylenes	<0.50
B-31	10	12/22/2010	Total Xylenes	0.62
B-6	5	5/23/1995	Total Xylenes	1.1
B-7	5	5/23/1995	Total Xylenes	1.1
B-32	10	12/22/2010	Total Xylenes	<2.5
B-38	10	12/21/2010	Total Xylenes	<2.5
B-44	10	12/21/2010	Total Xylenes	<2.5
B-35	10	12/22/2010	Total Xylenes	2.6
MW-6	10	1/4/2006	Total Xylenes	3.2 i
B-36	10	12/22/2010	Total Xylenes	5
B-42	5	12/20/2010	Total Xylenes	<5.0
B-46	10	12/21/2010	Total Xylenes	5.8
GP-6	9.5	8/29/2005	Total Xylenes	6.8
B-43	10	12/21/2010	Total Xylenes	7.3
B-2	5	5/23/1995	Total Xylenes	10
B-24	10	12/20/2010	Total Xylenes	22
B-6	10	5/23/1995	Total Xylenes	27
B-22	8	4/11/2002	Total Xylenes	31
B-28	10	12/20/2010	Total Xylenes	37
B-25	10	12/23/2010	Total Xylenes	51
B-41	8.5	12/20/2010	Total Xylenes	56
GP-7	9.5	8/30/2005	Total Xylenes	59
B-23	10	1/3/2006	Total Xylenes	62 i
B-39	10	12/21/2010	Total Xylenes	67
B-37	10	12/22/2010	Total Xylenes	87

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Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-26	10	12/20/2010	Total Xylenes	110
B-17	7	11/22/2000	Total Xylenes	140
B-27	10	12/20/2010	Total Xylenes	140
B-33	10	12/22/2010	Total Xylenes	140
GP-3	8.5	8/29/2005	Total Xylenes	230
B-30	10	12/23/2010	Total Xylenes	240
B-41	10	12/20/2010	Total Xylenes	290
B-40	10	12/21/2010	Total Xylenes	430
B-42	10	12/20/2010	Total Xylenes	1400
S-3	2	1/22/2013	TPHd	<2.4
B-4	2	1/22/2013	TPHd	<2.5
S-2	2	1/22/2013	TPHd	2.55 b
N-2	2	1/22/2013	TPHd	2.63 b
B-2	2	1/22/2013	TPHd	2.85 b
B-3	2	1/22/2013	TPHd	3.74 b
S-1	2	1/22/2013	TPHd	4.84 b
HA-10	4.5	12/13/2010	TPHd	<5.0
HA-11	1	12/13/2010	TPHd	<5.0
HA-11	4.5	12/13/2010	TPHd	<5.0
HA-12	4.5	12/13/2010	TPHd	<5.0
HA-13	4.5	12/13/2010	TPHd	<5.0
HA-14	1	4/18/2012	TPHd	<5.0
HA-14	4.5	4/18/2012	TPHd	<5.0
HA-15	4.5	4/18/2012	TPHd	<5.0
HA-16	4.5	4/18/2012	TPHd	<5.0
HA-17	4.5	4/18/2012	TPHd	<5.0
HA-18	4.5	4/18/2012	TPHd	<5.0
HA-2	5	4/8/2009	TPHd	<5.0
HA-20	0	4/22/2013	TPHd	<5.0
HA-3	5	4/8/2009	TPHd	<5.0
HA-4	5	4/8/2009	TPHd	<5.0
HA-5	5	4/8/2009	TPHd	<5.0
HA-7	5	4/8/2009	TPHd	<5.0
HA-9	4.5	12/13/2010	TPHd	<5.0
HA-16	1	4/18/2012	TPHd	7.3
HA-18	1	4/18/2012	TPHd	7.3
OX-3	3	2/21/2013	TPHd	7.36
HA-13	1	12/13/2010	TPHd	7.8a
W-1	2	1/22/2013	TPHd	8.52 b
HA-17	1	4/18/2012	TPHd	<10
HA-15	1	4/18/2012	TPHd	11
HA-9	1	12/13/2010	TPHd	11 a
OX-2	3	2/21/2013	TPHd	13.2
B-5	2	1/22/2013	TPHd	13.8
HA-1	5	4/8/2009	TPHd	19 a
HA-15	0	4/18/2012	TPHd	23
N-1	2	1/22/2013	TPHd	28.6 b
HA-8	5	4/8/2009	TPHd	35 a
HA-12	0	12/13/2010	TPHd	39 a

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-12	1	12/13/2010	TPHd	39 a
N-3	2	1/22/2013	TPHd	40.2
OX-1	3	2/21/2013	TPHd	41.9
HA-14	0	4/18/2012	TPHd	47
HA-17	0	4/18/2012	TPHd	50
B-1	2	1/22/2013	TPHd	50.6
HA-22	0	4/22/2013	TPHd	52
HA-18	0	4/18/2012	TPHd	53
HA-24	0	4/22/2013	TPHd	69
HA-16	0	4/18/2012	TPHd	89
HA-19	0	4/22/2013	TPHd	90
HA-23	0	4/22/2013	TPHd	97
HA-21	0	4/22/2013	TPHd	100
HA-11	0	12/13/2010	TPHd	120a
HA-6	5	4/8/2009	TPHd	130 a
HA-9	0	12/13/2010	TPHd	140a
HA-10	0	12/13/2010	TPHd	150a
HA-13	0	12/13/2010	TPHd	210a
HA-10	1	12/13/2010	TPHd	430a
MW-13	10	3/24/2015	TPHg	<0.099
MW-13	5	3/24/2015	TPHg	<0.099
B-24	5	12/20/2010	TPHg	<0.50
B-26	5	12/20/2010	TPHg	<0.50
B-27	5	12/20/2010	TPHg	<0.50
B-28	5	12/20/2010	TPHg	<0.50
B-29	10	12/20/2010	TPHg	<0.50
B-29	5	12/20/2010	TPHg	<0.50
B-31	5	12/22/2010	TPHg	<0.50
B-34	5	12/22/2010	TPHg	<0.50
B-35	5	12/22/2010	TPHg	<0.50
B-36	5	12/22/2010	TPHg	<0.50
B-47	5	12/21/2010	TPHg	<0.50
MW-10	5	8/10/2010	TPHg	<0.50
MW-10	9.5	8/10/2010	TPHg	<0.50
MW-11	5	8/10/2010	TPHg	<0.50
MW-11	9.5	8/10/2010	TPHg	<0.50
MW-9	5	8/10/2010	TPHg	<0.50
MW-9	9.5	8/10/2010	TPHg	<0.50
VP-7	4.5	6/6/2007	TPHg	<0.50
VP-8	4.5	5/29/2007	TPHg	<0.50
VP-9	4.5	7/23/2008	TPHg	<0.50
B-11	5	7/17/1996	TPHg	<1.0
B-12	5.5	7/17/1996	TPHg	<1.0
B-13	5.5	7/17/1996	TPHg	<1.0
B-19	5	11/22/2000	TPHg	<1.0
B-21	3	4/11/2002	TPHg	<1.0
B-21	8	4/11/2002	TPHg	<1.0
B-22	3	4/11/2002	TPHg	<1.0
B-23	5	1/3/2006	TPHg	<1.0 g,h

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-48	5	12/21/2010	TPHg	1
GP-1	4.5	8/31/2005	TPHg	<1.0
GP-1	5	8/29/2005	TPHg	<1.0
GP-4	4.5	8/31/2005	TPHg	<1.0
GP-5	4.5	8/30/2005	TPHg	<1.0
GP-6	5	8/29/2005	TPHg	<1.0
GP-7	5	8/30/2005	TPHg	<1.0
GP-8	4.5	8/30/2005	TPHg	<1.0
GP-9	4.5	8/31/2005	TPHg	<1.0
MW-12	10	2/28/2006	TPHg	<1.0
MW-12	5	2/28/2006	TPHg	<1.0
MW-14	5	2/28/2006	TPHg	<1.0
MW-3	5	11/22/2000	TPHg	<1.0
MW-4	5	11/22/2000	TPHg	<1.0
MW-5	5	11/22/2000	TPHg	<1.0
MW-7	5.5	1/4/2006	TPHg	<1.0 g,h
MW-8	6.5	1/3/2006	TPHg	<1.0 g,h
B-20	4.5	4/11/2002	TPHg	1.1
B-18	5	11/22/2000	TPHg	1.2
B-38	5	12/21/2010	TPHg	1.2
B-45	5	12/21/2010	TPHg	1.2
B-17	5	11/22/2000	TPHg	1.3
B-44	5	12/21/2010	TPHg	1.3
GP-2	4.5	8/29/2005	TPHg	1.5
B-10	6	7/17/1996	TPHg	1.7
B-25	5	12/23/2010	TPHg	1.9
B-19	7	11/22/2000	TPHg	2.4
MW-6	5	1/4/2006	TPHg	<4.9 g,h
GP-3	5	8/29/2005	TPHg	7.5
B-7	5	5/23/1995	TPHg	<20
B-8	10	5/23/1995	TPHg	<20
B-20	7.5	4/11/2002	TPHg	22
MW-14	10	2/28/2006	TPHg	32
B-18	7	11/22/2000	TPHg	42
B-30	5	12/23/2010	TPHg	<50
B-37	5	12/22/2010	TPHg	<50
B-38	8.2	12/21/2010	TPHg	<50
B-46	5	12/21/2010	TPHg	<50
B-7	10	5/23/1995	TPHg	53
B-4	6	5/23/1995	TPHg	55
B-33	5	12/22/2010	TPHg	60
B-40	5	12/21/2010	TPHg	68
B-48	10	12/21/2010	TPHg	74
V-2	5.5	7/19/1996	TPHg	110
B-32	5	12/22/2010	TPHg	130
B-47	10	12/21/2010	TPHg	130
B-6	5	5/23/1995	TPHg	130
B-39	5	12/21/2010	TPHg	140
B-39	8.5	12/21/2010	TPHg	140

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
B-3	6	5/23/1995	TPHg	150
B-43	5	12/21/2010	TPHg	170
GP-1	10	8/29/2005	TPHg	190 f
B-45	10	12/21/2010	TPHg	200
B-46	8.5	12/21/2010	TPHg	210
B-32	7	12/22/2010	TPHg	220
B-36	10	12/22/2010	TPHg	230
B-2	5	5/23/1995	TPHg	260
GP-6	9.5	8/29/2005	TPHg	260
B-34	10	12/22/2010	TPHg	290
MW-6	10	1/4/2006	TPHg	290
B-35	10	12/22/2010	TPHg	300
B-22	8	4/11/2002	TPHg	380
B-6	10	5/23/1995	TPHg	390
GP-7	9.5	8/30/2005	TPHg	440
B-28	10	12/20/2010	TPHg	460
B-41	5	12/20/2010	TPHg	470
B-23	10	1/3/2006	TPHg	520
B-24	10	12/20/2010	TPHg	550
B-44	10	12/21/2010	TPHg	570
B-25	10	12/23/2010	TPHg	730
B-38	10	12/21/2010	TPHg	980
B-46	10	12/21/2010	TPHg	1000
B-26	10	12/20/2010	TPHg	1100
B-43	10	12/21/2010	TPHg	1300
B-37	10	12/22/2010	TPHg	1,500 e
B-27	10	12/20/2010	TPHg	1600
B-32	10	12/22/2010	TPHg	1800
B-33	10	12/22/2010	TPHg	1800
B-17	7	11/22/2000	TPHg	2100
B-30	10	12/23/2010	TPHg	2300
B-31	10	12/22/2010	TPHg	2300
B-39	10	12/21/2010	TPHg	2600
B-42	5	12/20/2010	TPHg	3000
GP-3	8.5	8/29/2005	TPHg	3300
B-40	10	12/21/2010	TPHg	4200
B-41	10	12/20/2010	TPHg	4500
B-41	8.5	12/20/2010	TPHg	7200
B-42	10	12/20/2010	TPHg	17000
S-2	2	1/22/2013	TPHmo	<4.8
B-2	2	1/22/2013	TPHmo	<4.9
B-4	2	1/22/2013	TPHmo	<4.9
S-3	2	1/22/2013	TPHmo	<4.9
B-3	2	1/22/2013	TPHmo	<5.0
HA-14	1	4/18/2012	TPHmo	<5.0
HA-14	4.5	4/18/2012	TPHmo	<5.0
HA-15	4.5	4/18/2012	TPHmo	<5.0
HA-16	4.5	4/18/2012	TPHmo	<5.0
HA-17	4.5	4/18/2012	TPHmo	<5.0

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result
HA-18	4.5	4/18/2012	TPHmo	<5.0
HA-20	0	4/22/2013	TPHmo	<5.0
N-2	2	1/22/2013	TPHmo	<5.0
HA-18	1	4/18/2012	TPHmo	8.3
HA-15	0	4/18/2012	TPHmo	<10
HA-15	1	4/18/2012	TPHmo	<10
HA-16	1	4/18/2012	TPHmo	10
HA-17	1	4/18/2012	TPHmo	<10
OX-3	3	2/21/2013	TPHmo	14.4
S-1	2	1/22/2013	TPHmo	23.4
W-1	2	1/22/2013	TPHmo	23.6
HA-10	4.5	12/13/2010	TPHmo	<25
HA-11	1	12/13/2010	TPHmo	<25
HA-11	4.5	12/13/2010	TPHmo	<25
HA-12	4.5	12/13/2010	TPHmo	<25
HA-13	1	12/13/2010	TPHmo	<25
HA-13	4.5	12/13/2010	TPHmo	<25
HA-2	5	4/8/2009	TPHmo	<25
HA-3	5	4/8/2009	TPHmo	<25
HA-4	5	4/8/2009	TPHmo	<25
HA-5	5	4/8/2009	TPHmo	<25
HA-7	5	4/8/2009	TPHmo	<25
HA-9	4.5	12/13/2010	TPHmo	<25
HA-9	1	12/13/2010	TPHmo	26
B-5	2	1/22/2013	TPHmo	36.9
OX-1	3	2/21/2013	TPHmo	53
OX-2	3	2/21/2013	TPHmo	54.9
HA-18	0	4/18/2012	TPHmo	61
HA-14	0	4/18/2012	TPHmo	69
HA-16	0	4/18/2012	TPHmo	75
HA-17	0	4/18/2012	TPHmo	81
HA-22	0	4/22/2013	TPHmo	93
HA-1	5	4/8/2009	TPHmo	97
HA-24	0	4/22/2013	TPHmo	99
B-1	2	1/22/2013	TPHmo	109
N-1	2	1/22/2013	TPHmo	116
HA-12	0	12/13/2010	TPHmo	120
HA-19	0	4/22/2013	TPHmo	120
HA-12	1	12/13/2010	TPHmo	130
HA-23	0	4/22/2013	TPHmo	160
N-3	2	1/22/2013	TPHmo	184
HA-8	5	4/8/2009	TPHmo	190
HA-6	5	4/8/2009	TPHmo	230
HA-21	0	4/22/2013	TPHmo	250
HA-11	0	12/13/2010	TPHmo	340a
HA-10	0	12/13/2010	TPHmo	370a
HA-9	0	12/13/2010	TPHmo	470
HA-13	0	12/13/2010	TPHmo	920
HA-10	1	12/13/2010	TPHmo	1200

Appendix B-1
Soil Data Used in Risk Assessment

Sample Location	Sample Depth (ft bgs)	Sample Date	Analyte	Result

Notes
All results are reported in mg/kg.
Excavated samples and samples collected from depths greater than 10 ft bgs were not included.
a = The sample chromatographic pattern for TPH does not match the chromatographic pattern of the spec
b = Indicates an estimated value below method reporting limit.
c = Compound found in blank and in sample
d = Boring drilled in same location as December 2010 boring
e = Heavier gasoline range compounds are significant (aged gasoline?).
f = Quantity of unknown hydrocarbon(s) in sample based on gasoline.
g = Extracted out of hold time
h = Analyzed by EPA Method 8260
i = Analyzed by EPA Method 8021
Acronyms
mg/kg = milligrams per kilogram
ft bgs = feet below ground surface

Appendix B-2
Groundwater Data Used in Risk Assessment

Sample Location	Sample Date	Analyte	Result
MW-10	11/18/2013	Benzene	9.8
MW-10	6/6/2014	Benzene	1.7
MW-10	12/1/2014	Benzene	1.3
MW-11	11/18/2013	Benzene	<0.50
MW-11	6/6/2014	Benzene	<0.50
MW-11	12/1/2014	Benzene	<0.50
MW-12	11/18/2013	Benzene	<0.50
MW-13	5/22/2015	Benzene	430
MW-13	8/14/2015	Benzene	550
MW-14	11/18/2013	Benzene	1,200
MW-14	6/6/2014	Benzene	900
MW-14	12/1/2014	Benzene	1,600
MW-14	5/22/2015	Benzene	320
MW-4	11/18/2013	Benzene	2,400
MW-4	6/6/2014	Benzene	1,800
MW-4	12/1/2014	Benzene	1,400
MW-4	5/22/2015	Benzene	1,500
MW-5	11/18/2013	Benzene	5,000
MW-5	6/6/2014	Benzene	6,200
MW-5	12/1/2014	Benzene	4,900
MW-5	5/22/2015	Benzene	5,300
MW-6	11/18/2013	Benzene	460
MW-6	6/6/2014	Benzene	400
MW-6	12/1/2014	Benzene	110
MW-6	5/22/2015	Benzene	360
MW-7	11/18/2013	Benzene	620
MW-7	6/6/2014	Benzene	140
MW-7	12/1/2014	Benzene	490
MW-7	5/22/2015	Benzene	210
MW-8	11/18/2013	Benzene	240
MW-8	6/6/2014	Benzene	120
MW-8	12/1/2014	Benzene	92
MW-8	5/22/2015	Benzene	80
MW-9	11/18/2013	Benzene	<5.0
MW-9	6/6/2014	Benzene	23
MW-9	12/1/2014	Benzene	17
V-1	11/18/2013	Benzene	1.7
V-1	6/6/2014	Benzene	1.7
V-1	12/1/2014	Benzene	<0.50
V-1	5/22/2015	Benzene	1.1
V-2	11/18/2013	Benzene	460
V-2	6/6/2014	Benzene	420
V-2	12/1/2014	Benzene	470
MW-14	11/18/2013	DIPE	16
MW-14	12/1/2014	DIPE	<20
MW-4	11/18/2013	DIPE	<20
MW-4	12/1/2014	DIPE	<10
MW-5	11/18/2013	DIPE	<50
MW-5	12/1/2014	DIPE	<50
MW-6	11/18/2013	DIPE	<5.0

Appendix B-2
Groundwater Data Used in Risk Assessment

Sample Location	Sample Date	Analyte	Result
MW-6	12/1/2014	DIPE	2.3
MW-7	11/18/2013	DIPE	<5.0
MW-7	12/1/2014	DIPE	<5.0
MW-8	11/18/2013	DIPE	<2.0
MW-8	12/1/2014	DIPE	<2.5
V-1	11/18/2013	DIPE	<0.50
V-1	12/1/2014	DIPE	<0.50
MW-14	11/18/2013	ETBE	<10
MW-14	12/1/2014	ETBE	<20
MW-4	11/18/2013	ETBE	<20
MW-4	12/1/2014	ETBE	<10
MW-5	11/18/2013	ETBE	<50
MW-5	12/1/2014	ETBE	<50
MW-6	11/18/2013	ETBE	<5.0
MW-6	12/1/2014	ETBE	<1.0
MW-7	11/18/2013	ETBE	<5.0
MW-7	12/1/2014	ETBE	<5.0
MW-8	11/18/2013	ETBE	<2.0
MW-8	12/1/2014	ETBE	<2.5
V-1	11/18/2013	ETBE	<0.50
V-1	12/1/2014	ETBE	<0.50
MW-10	11/18/2013	Ethylbenzene	150
MW-10	6/6/2014	Ethylbenzene	21
MW-10	12/1/2014	Ethylbenzene	8.8
MW-11	11/18/2013	Ethylbenzene	<0.50
MW-11	6/6/2014	Ethylbenzene	<0.50
MW-11	12/1/2014	Ethylbenzene	<0.50
MW-12	11/18/2013	Ethylbenzene	<0.50
MW-13	5/22/2015	Ethylbenzene	16
MW-13	8/14/2015	Ethylbenzene	8.5
MW-14	11/18/2013	Ethylbenzene	2,700
MW-14	6/6/2014	Ethylbenzene	2,800
MW-14	12/1/2014	Ethylbenzene	2,700
MW-14	5/22/2015	Ethylbenzene	490
MW-4	11/18/2013	Ethylbenzene	43
MW-4	6/6/2014	Ethylbenzene	110
MW-4	12/1/2014	Ethylbenzene	33
MW-4	5/22/2015	Ethylbenzene	54
MW-5	11/18/2013	Ethylbenzene	4,400
MW-5	6/6/2014	Ethylbenzene	5,900
MW-5	12/1/2014	Ethylbenzene	4,700
MW-5	5/22/2015	Ethylbenzene	5,000
MW-6	11/18/2013	Ethylbenzene	150
MW-6	6/6/2014	Ethylbenzene	97
MW-6	12/1/2014	Ethylbenzene	7.2
MW-6	5/22/2015	Ethylbenzene	60
MW-7	11/18/2013	Ethylbenzene	7.8
MW-7	6/6/2014	Ethylbenzene	<2.0
MW-7	12/1/2014	Ethylbenzene	<5.0
MW-7	5/22/2015	Ethylbenzene	<2.5

Appendix B-2
Groundwater Data Used in Risk Assessment

Sample Location	Sample Date	Analyte	Result
MW-8	11/18/2013	Ethylbenzene	11
MW-8	6/6/2014	Ethylbenzene	4.6
MW-8	12/1/2014	Ethylbenzene	2.9
MW-8	5/22/2015	Ethylbenzene	4.3
MW-9	11/18/2013	Ethylbenzene	19
MW-9	6/6/2014	Ethylbenzene	190
MW-9	12/1/2014	Ethylbenzene	110
V-1	11/18/2013	Ethylbenzene	1.5
V-1	6/6/2014	Ethylbenzene	5.1
V-1	12/1/2014	Ethylbenzene	<0.50
V-1	5/22/2015	Ethylbenzene	2.3
V-2	11/18/2013	Ethylbenzene	4,500
V-2	6/6/2014	Ethylbenzene	5,400
V-2	12/1/2014	Ethylbenzene	3,900
MW-14	11/18/2013	MTBE 8260	<10
MW-14	12/1/2014	MTBE 8260	<20
MW-4	11/18/2013	MTBE 8260	<20
MW-4	12/1/2014	MTBE 8260	<10
MW-5	11/18/2013	MTBE 8260	<50
MW-5	12/1/2014	MTBE 8260	<50
MW-6	11/18/2013	MTBE 8260	<5.0
MW-6	12/1/2014	MTBE 8260	<1.0
MW-7	11/18/2013	MTBE 8260	<5.0
MW-7	12/1/2014	MTBE 8260	<5.0
MW-8	11/18/2013	MTBE 8260	<2.0
MW-8	12/1/2014	MTBE 8260	<2.5
V-1	11/18/2013	MTBE 8260	<0.50
V-1	12/1/2014	MTBE 8260	<0.50
MW-14	11/18/2013	TAME	<10
MW-14	12/1/2014	TAME	<20
MW-4	11/18/2013	TAME	<20
MW-4	12/1/2014	TAME	<10
MW-5	11/18/2013	TAME	<50
MW-5	12/1/2014	TAME	<50
MW-6	11/18/2013	TAME	<5.0
MW-6	12/1/2014	TAME	<1.0
MW-7	11/18/2013	TAME	<5.0
MW-7	12/1/2014	TAME	<5.0
MW-8	11/18/2013	TAME	<2.0
MW-8	12/1/2014	TAME	<2.5
V-1	11/18/2013	TAME	<0.50
V-1	12/1/2014	TAME	<0.50
MW-14	11/18/2013	TBA	<200
MW-14	12/1/2014	TBA	<400
MW-4	11/18/2013	TBA	<400
MW-4	12/1/2014	TBA	<200
MW-5	11/18/2013	TBA	<1,000
MW-5	12/1/2014	TBA	<1,000
MW-6	11/18/2013	TBA	<100
MW-6	12/1/2014	TBA	<20

Appendix B-2
Groundwater Data Used in Risk Assessment

Sample Location	Sample Date	Analyte	Result
MW-7	11/18/2013	TBA	<100
MW-7	12/1/2014	TBA	<100
MW-8	11/18/2013	TBA	<40
MW-8	12/1/2014	TBA	<50
V-1	11/18/2013	TBA	<10
V-1	12/1/2014	TBA	<10
MW-10	11/18/2013	Toluene	<5.0
MW-10	6/6/2014	Toluene	<0.50
MW-10	12/1/2014	Toluene	<0.50
MW-11	11/18/2013	Toluene	<0.50
MW-11	6/6/2014	Toluene	<0.50
MW-11	12/1/2014	Toluene	<0.50
MW-12	11/18/2013	Toluene	<0.50
MW-13	5/22/2015	Toluene	5.9
MW-13	8/14/2015	Toluene	<5.0
MW-14	11/18/2013	Toluene	23
MW-14	6/6/2014	Toluene	<50
MW-14	12/1/2014	Toluene	24
MW-14	5/22/2015	Toluene	<10
MW-4	11/18/2013	Toluene	33
MW-4	6/6/2014	Toluene	<25
MW-4	12/1/2014	Toluene	17
MW-4	5/22/2015	Toluene	48
MW-5	11/18/2013	Toluene	5,300
MW-5	6/6/2014	Toluene	5,800
MW-5	12/1/2014	Toluene	4,400
MW-5	5/22/2015	Toluene	4,100
MW-6	11/18/2013	Toluene	15
MW-6	6/6/2014	Toluene	53
MW-6	12/1/2014	Toluene	5.8
MW-6	5/22/2015	Toluene	39
MW-7	11/18/2013	Toluene	5.4
MW-7	6/6/2014	Toluene	<2.0
MW-7	12/1/2014	Toluene	7.1
MW-7	5/22/2015	Toluene	3
MW-8	11/18/2013	Toluene	8.2
MW-8	6/6/2014	Toluene	2.5
MW-8	12/1/2014	Toluene	3.2
MW-8	5/22/2015	Toluene	2.6
MW-9	11/18/2013	Toluene	<5.0
MW-9	6/6/2014	Toluene	<5.0
MW-9	12/1/2014	Toluene	<5.0
V-1	11/18/2013	Toluene	<0.50
V-1	6/6/2014	Toluene	<0.50
V-1	12/1/2014	Toluene	<0.50
V-1	5/22/2015	Toluene	<0.50
V-2	11/18/2013	Toluene	140
V-2	6/6/2014	Toluene	130
V-2	12/1/2014	Toluene	140
MW-10	11/18/2013	TPHg	5,400

Appendix B-2
Groundwater Data Used in Risk Assessment

Sample Location	Sample Date	Analyte	Result
MW-10	6/6/2014	TPHg	1,000
MW-10	12/1/2014	TPHg	890
MW-11	11/18/2013	TPHg	<50
MW-11	6/6/2014	TPHg	<50
MW-11	12/1/2014	TPHg	<50
MW-12	11/18/2013	TPHg	<50
MW-13	5/22/2015	TPHg	4,100
MW-13	8/14/2015	TPHg	5,000
MW-14	11/18/2013	TPHg	33,000
MW-14	6/6/2014	TPHg	68,000
MW-14	12/1/2014	TPHg	36,000
MW-14	5/22/2015	TPHg	5,200
MW-4	11/18/2013	TPHg	10,000
MW-4	6/6/2014	TPHg	8,900
MW-4	12/1/2014	TPHg	8,500 b
MW-4	5/22/2015	TPHg	7,100
MW-5	11/18/2013	TPHg	74,000
MW-5	6/6/2014	TPHg	95,000 a
MW-5	12/1/2014	TPHg	85,000
MW-5	5/22/2015	TPHg	99,000
MW-6	11/18/2013	TPHg	3,500
MW-6	6/6/2014	TPHg	2,000
MW-6	12/1/2014	TPHg	520 b
MW-6	5/22/2015	TPHg	1,600
MW-7	11/18/2013	TPHg	3,700
MW-7	6/6/2014	TPHg	2,000
MW-7	12/1/2014	TPHg	2,900
MW-7	5/22/2015	TPHg	2,100
MW-8	11/18/2013	TPHg	11,000
MW-8	6/6/2014	TPHg	7,000
MW-8	12/1/2014	TPHg	6,600
MW-8	5/22/2015	TPHg	6,800
MW-9	11/18/2013	TPHg	760
MW-9	6/6/2014	TPHg	7,600
MW-9	12/1/2014	TPHg	7,700
V-1	11/18/2013	TPHg	610
V-1	6/6/2014	TPHg	410
V-1	12/1/2014	TPHg	50
V-1	5/22/2015	TPHg	500
V-2	11/18/2013	TPHg	45,000
V-2	6/6/2014	TPHg	65,000
V-2	12/1/2014	TPHg	42,000
MW-10	11/18/2013	Xylenes	19
MW-10	6/6/2014	Xylenes	2.3
MW-10	12/1/2014	Xylenes	<1.0
MW-11	11/18/2013	Xylenes	<1.0
MW-11	6/6/2014	Xylenes	<1.0
MW-11	12/1/2014	Xylenes	<1.0
MW-12	11/18/2013	Xylenes	<1.0
MW-13	5/22/2015	Xylenes	<10

Appendix B-2
Groundwater Data Used in Risk Assessment

Sample Location	Sample Date	Analyte	Result
MW-13	8/14/2015	Xylenes	<10
MW-14	11/18/2013	Xylenes	950
MW-14	6/6/2014	Xylenes	680
MW-14	12/1/2014	Xylenes	700
MW-14	5/22/2015	Xylenes	120
MW-4	11/18/2013	Xylenes	<40
MW-4	6/6/2014	Xylenes	55
MW-4	12/1/2014	Xylenes	91
MW-4	5/22/2015	Xylenes	<40
MW-5	11/18/2013	Xylenes	24,000
MW-5	6/6/2014	Xylenes	31,000
MW-5	12/1/2014	Xylenes	22,000
MW-5	5/22/2015	Xylenes	27,000
MW-6	11/18/2013	Xylenes	130
MW-6	6/6/2014	Xylenes	350
MW-6	12/1/2014	Xylenes	46
MW-6	5/22/2015	Xylenes	240
MW-7	11/18/2013	Xylenes	130
MW-7	6/6/2014	Xylenes	16
MW-7	12/1/2014	Xylenes	140
MW-7	5/22/2015	Xylenes	48
MW-8	11/18/2013	Xylenes	630
MW-8	6/6/2014	Xylenes	170
MW-8	12/1/2014	Xylenes	180
MW-8	5/22/2015	Xylenes	140
MW-9	11/18/2013	Xylenes	<10
MW-9	6/6/2014	Xylenes	31
MW-9	12/1/2014	Xylenes	17
V-1	11/18/2013	Xylenes	<1.0
V-1	6/6/2014	Xylenes	<1.0
V-1	12/1/2014	Xylenes	<1.0
V-1	5/22/2015	Xylenes	<1.0
V-2	11/18/2013	Xylenes	4,400
V-2	6/6/2014	Xylenes	4,800
V-2	12/1/2014	Xylenes	3,600

Notes
All results are reported in ug/L.
Only samples from the eight most recent groundwater monitoring events were included.
a = Concentration reported is due to the presence of discrete peaks of xylenes.
b = Concentration reported is due to the presence of discrete peak of benzene.
Acronyms
ug/L = micrograms per liter

Appendix B-3
Soil Vapor Data Used in Risk Assessment

Sample Location	Sample Depth	Date	Analyte	Result
VP-12	3	4/16/2015	Benzene	<16
VP-12	3	8/27/2015	Benzene	<16
VP-12	5	4/16/2015	Benzene	<16
VP-12	5	8/27/2015	Benzene	<16
VP-13	3	4/16/2015	Benzene	770
VP-13	3	8/27/2015	Benzene	<16
VP-13	5	4/16/2015	Benzene	<16
VP-13	5	8/27/2015	Benzene	<16
VP-14	3	4/16/2015	Benzene	240,000
VP-14	3	8/27/2015	Benzene	190,000
VP-14	5	4/16/2015	Benzene	690,000
VP-14	5	8/27/2015	Benzene	280,000
VP-3	3	8/27/2015	Benzene	50
VP-3	5	4/16/2015	Benzene	<16,000
VP-3	5	8/27/2015	Benzene	<16,000
VP-12	3	4/16/2015	Carbon Dioxide	3.4
VP-12	3	8/27/2015	Carbon Dioxide	3.02
VP-12	5	4/16/2015	Carbon Dioxide	1.33
VP-12	5	8/27/2015	Carbon Dioxide	3.75
VP-13	3	4/16/2015	Carbon Dioxide	1.09
VP-13	3	8/27/2015	Carbon Dioxide	1.49
VP-13	5	4/16/2015	Carbon Dioxide	1.38
VP-13	5	8/27/2015	Carbon Dioxide	0.735
VP-14	3	4/16/2015	Carbon Dioxide	9.97
VP-14	3	8/27/2015	Carbon Dioxide	12.4
VP-14	5	4/16/2015	Carbon Dioxide	8.11
VP-14	5	8/27/2015	Carbon Dioxide	12.6
VP-3	3	8/27/2015	Carbon Dioxide	3.9
VP-3	5	4/16/2015	Carbon Dioxide	6.75
VP-3	5	8/27/2015	Carbon Dioxide	5.8
VP-12	3	4/16/2015	Ethylbenzene	<22
VP-12	3	8/27/2015	Ethylbenzene	<22
VP-12	5	4/16/2015	Ethylbenzene	<22
VP-12	5	8/27/2015	Ethylbenzene	<22
VP-13	3	4/16/2015	Ethylbenzene	<220
VP-13	3	8/27/2015	Ethylbenzene	<22
VP-13	5	4/16/2015	Ethylbenzene	<22
VP-13	5	8/27/2015	Ethylbenzene	<22
VP-14	3	4/16/2015	Ethylbenzene	<22,000
VP-14	3	8/27/2015	Ethylbenzene	<27,000
VP-14	5	4/16/2015	Ethylbenzene	94,000
VP-14	5	8/27/2015	Ethylbenzene	48,000
VP-3	3	8/27/2015	Ethylbenzene	22
VP-3	5	4/16/2015	Ethylbenzene	<22,000
VP-3	5	8/27/2015	Ethylbenzene	<22,000
VP-12	3	4/16/2015	Helium	<0.0100
VP-12	3	8/27/2015	Helium	0.0284
VP-12	5	4/16/2015	Helium	<0.0100
VP-12	5	8/27/2015	Helium	<0.0100
VP-13	3	4/16/2015	Helium	0.299
VP-13	3	8/27/2015	Helium	<0.0100
VP-13	5	4/16/2015	Helium	<0.0100
VP-13	5	8/27/2015	Helium	0.185
VP-14	3	4/16/2015	Helium	<0.0100
VP-14	3	8/27/2015	Helium	0.0144
VP-14	5	4/16/2015	Helium	0.0631

Appendix B-3
Soil Vapor Data Used in Risk Assessment

Sample Location	Sample Depth	Date	Analyte	Result
VP-14	5	8/27/2015	Helium	0.275
VP-3	3	8/27/2015	Helium	0.106
VP-3	5	4/16/2015	Helium	<0.0100
VP-3	5	8/27/2015	Helium	0.0265
VP-12	3	4/16/2015	Methane	<0.500
VP-12	3	8/27/2015	Methane	<0.500
VP-12	5	4/16/2015	Methane	<0.500
VP-12	5	8/27/2015	Methane	<0.500
VP-13	3	4/16/2015	Methane	<0.500
VP-13	3	8/27/2015	Methane	<0.500
VP-13	5	4/16/2015	Methane	<0.500
VP-13	5	8/27/2015	Methane	<0.500
VP-14	3	4/16/2015	Methane	11.3
VP-14	3	8/27/2015	Methane	7.75
VP-14	5	4/16/2015	Methane	11.8
VP-14	5	8/27/2015	Methane	14.4
VP-3	3	8/27/2015	Methane	<0.500
VP-3	5	4/16/2015	Methane	34.7
VP-3	5	8/27/2015	Methane	21.5
VP-12	3	4/16/2015	Naphthalene	<52
VP-12	3	8/27/2015	Naphthalene	<52
VP-12	5	4/16/2015	Naphthalene	<52
VP-12	5	8/27/2015	Naphthalene	<52
VP-13	3	4/16/2015	Naphthalene	<520
VP-13	3	8/27/2015	Naphthalene	<52
VP-13	5	4/16/2015	Naphthalene	<52
VP-13	5	8/27/2015	Naphthalene	<52
VP-14	3	4/16/2015	Naphthalene	<52,000
VP-14	3	8/27/2015	Naphthalene	<66,000
VP-14	5	4/16/2015	Naphthalene	<52,000
VP-14	5	8/27/2015	Naphthalene	<84,000
VP-3	3	8/27/2015	Naphthalene	<52
VP-3	5	4/16/2015	Naphthalene	<52,000
VP-3	5	8/27/2015	Naphthalene	<52,000
VP-12	3	4/16/2015	Oxygen & Argon	18.4
VP-12	3	8/27/2015	Oxygen & Argon	20.3
VP-12	5	4/16/2015	Oxygen & Argon	13.7
VP-12	5	8/27/2015	Oxygen & Argon	19.8
VP-13	3	4/16/2015	Oxygen & Argon	21
VP-13	3	8/27/2015	Oxygen & Argon	21.6
VP-13	5	4/16/2015	Oxygen & Argon	18.1
VP-13	5	8/27/2015	Oxygen & Argon	22.2
VP-14	3	4/16/2015	Oxygen & Argon	2.49
VP-14	3	8/27/2015	Oxygen & Argon	3.15

Appendix B-3
Soil Vapor Data Used in Risk Assessment

Sample Location	Sample Depth	Date	Analyte	Result
VP-14	5	4/16/2015	Oxygen & Argon	5.5
VP-14	5	8/27/2015	Oxygen & Argon	3.6
VP-3	3	8/27/2015	Oxygen & Argon	18.6
VP-3	5	4/16/2015	Oxygen & Argon	2.21
VP-3	5	8/27/2015	Oxygen & Argon	11.1
VP-12	3	4/16/2015	Toluene	<19
VP-12	3	8/27/2015	Toluene	<19
VP-12	5	4/16/2015	Toluene	<19
VP-12	5	8/27/2015	Toluene	<19
VP-13	3	4/16/2015	Toluene	<190
VP-13	3	8/27/2015	Toluene	<19
VP-13	5	4/16/2015	Toluene	<19
VP-13	5	8/27/2015	Toluene	<19
VP-14	3	4/16/2015	Toluene	<19,000
VP-14	3	8/27/2015	Toluene	<24,000
VP-14	5	4/16/2015	Toluene	<19,000
VP-14	5	8/27/2015	Toluene	<30,000
VP-3	3	8/27/2015	Toluene	<19
VP-3	5	4/16/2015	Toluene	<19,000
VP-3	5	8/27/2015	Toluene	<19,000
VP-12	3	4/16/2015	Total Xylenes	<22
VP-12	3	8/27/2015	Total Xylenes	<22
VP-12	5	4/16/2015	Total Xylenes	<22
VP-12	5	8/27/2015	Total Xylenes	<22
VP-13	3	4/16/2015	Total Xylenes	<220
VP-13	3	8/27/2015	Total Xylenes	<22
VP-13	5	4/16/2015	Total Xylenes	<22
VP-13	5	8/27/2015	Total Xylenes	<22
VP-14	3	4/16/2015	Total Xylenes	<22,000
VP-14	3	8/27/2015	Total Xylenes	<27,000
VP-14	5	4/16/2015	Total Xylenes	<22,000
VP-14	5	8/27/2015	Total Xylenes	<35,000
VP-3	3	8/27/2015	Total Xylenes	<22
VP-3	5	4/16/2015	Total Xylenes	<22,000
VP-3	5	8/27/2015	Total Xylenes	<22,000
VP-12	3	4/16/2015	TPHg	81,000
VP-12	3	8/27/2015	TPHg	180,000
VP-12	5	4/16/2015	TPHg	130,000
VP-12	5	8/27/2015	TPHg	210,000
VP-13	3	4/16/2015	TPHg	320,000
VP-13	3	8/27/2015	TPHg	540,000
VP-13	5	4/16/2015	TPHg	35,000
VP-13	5	8/27/2015	TPHg	140,000
VP-14	3	4/16/2015	TPHg	290,000,000
VP-14	3	8/27/2015	TPHg	250,000,000
VP-14	5	4/16/2015	TPHg	270,000,000
VP-14	5	8/27/2015	TPHg	330,000,000
VP-3	3	8/27/2015	TPHg	41,000
VP-3	5	4/16/2015	TPHg	800,000,000
VP-3	5	8/27/2015	TPHg	270,000,000

Notes

All results are reported in ug/m^3.

Only samples the 2015 sampling events were included.

Acronyms

ug/m^3 = micrograms per liter

Appendix C.
ProUCL Output

Appendix C - ProUCL Output

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	11/9/2015 5:18:20 PM
From File	2703 MLK_Soil Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Conc (|soil|0-10|anthracene|)

General Statistics			
Total Number of Observations	58	Number of Distinct Observations	19
Number of Detects	4	Number of Non-Detects	54
Number of Distinct Detects	4	Number of Distinct Non-Detects	16
Minimum Detect	0.026	Minimum Non-Detect	0.02
Maximum Detect	0.055	Maximum Non-Detect	6.6
Variance Detects	1.8967E-4	Percent Non-Detects	93.1%
Mean Detects	0.0345	SD Detects	0.0138
Median Detects	0.0285	CV Detects	0.399
Skewness Detects	1.911	Kurtosis Detects	3.68
Mean of Logged Detects	-3.417	SD of Logged Detects	0.35

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.734	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.378	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level
Detected Data appear Approximate Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0221	Standard Error of Mean	0.0013
SD	0.00626	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0243	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0243	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.026	95% KM Chebyshev UCL	0.0278
97.5% KM Chebyshev UCL	0.0302	99% KM Chebyshev UCL	0.0351

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.652	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.378	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	10.1	k star (bias corrected MLE)	2.691
Theta hat (MLE)	0.00342	Theta star (bias corrected MLE)	0.0128
nu hat (MLE)	80.76	nu star (bias corrected)	21.52
MLE Mean (bias corrected)	0.0345	MLE Sd (bias corrected)	0.021
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	12.47	nu hat (KM)	1447
Approximate Chi Square Value (N/A, α)	1359	Adjusted Chi Square Value (N/A, β)	1357
95% Gamma Approximate KM-UCL (use when n>=50)	0.0235	95% Gamma Adjusted KM-UCL (use when n<50)	0.0236
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0125
Maximum	0.055	Median	0.01
SD	0.00715	CV	0.573
k hat (MLE)	6.533	k star (bias corrected MLE)	6.207
Theta hat (MLE)	0.00191	Theta star (bias corrected MLE)	0.00201
nu hat (MLE)	757.8	nu star (bias corrected)	720
MLE Mean (bias corrected)	0.0125	MLE Sd (bias corrected)	0.00501
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (719.98, α)	658.7	Adjusted Chi Square Value (719.98, β)	657.2
95% Gamma Approximate UCL (use when n>=50)	0.0136	95% Gamma Adjusted UCL (use when n<50)	N/A
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.773	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.351	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0134	Mean in Log Scale	-4.432
SD in Original Scale	0.00789	SD in Log Scale	0.481
95% t UCL (assumes normality of ROS data)	0.0152	95% Percentile Bootstrap UCL	0.0152
95% BCA Bootstrap UCL	0.0157	95% Bootstrap t UCL	0.0158
95% H-UCL (Log ROS)	0.015		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.836	95% H-UCL (KM -Log)	0.023
KM SD (logged)	0.197	95% Critical H Value (KM-Log)	1.723
KM Standard Error of Mean (logged)	0.0428		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.15	Mean in Log Scale	-3.275
SD in Original Scale	0.481	SD in Log Scale	1.345
95% t UCL (Assumes normality)	0.256	95% H-Stat UCL	0.158
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0243	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|0-10|benzene|)

General Statistics			
Total Number of Observations	118	Number of Distinct Observations	31
Number of Detects	22	Number of Non-Detects	96
Number of Distinct Detects	22	Number of Distinct Non-Detects	10
Minimum Detect	9.6000E-4	Minimum Non-Detect	9.9000E-4
Maximum Detect	72	Maximum Non-Detect	10
Variance Detects	236.6	Percent Non-Detects	81.36%
Mean Detects	5.234	SD Detects	15.38
Median Detects	0.295	CV Detects	2.939
Skewness Detects	4.27	Kurtosis Detects	19.04
Mean of Logged Detects	-1.394	SD of Logged Detects	2.997
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.373	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.376	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.991	Standard Error of Mean	0.641
SD	6.803	95% KM (BCA) UCL	2.143
95% KM (t) UCL	2.054	95% KM (Percentile Bootstrap) UCL	2.143

95% KM (z) UCL	2.046	95% KM Bootstrap t UCL	5.884
90% KM Chebyshev UCL	2.915	95% KM Chebyshev UCL	3.787
97.5% KM Chebyshev UCL	4.996	99% KM Chebyshev UCL	7.372
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.973	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.879	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.19	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.204	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.235	k star (bias corrected MLE)	0.233
Theta hat (MLE)	22.25	Theta star (bias corrected MLE)	22.42
nu hat (MLE)	10.35	nu star (bias corrected)	10.27
MLE Mean (bias corrected)	5.234	MLE Sd (bias corrected)	10.83
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0212	nu hat (KM)	5.006
Approximate Chi Square Value (5.01, α)	1.155	Adjusted Chi Square Value (5.01, β)	1.133
95% Gamma Approximate KM-UCL (use when n>=50)	4.295	95% Gamma Adjusted KM-UCL (use when n<50)	4.378
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	9.6000E-4	Mean	0.984
Maximum	72	Median	0.01
SD	6.83	CV	6.941
k hat (MLE)	0.186	k star (bias corrected MLE)	0.187
Theta hat (MLE)	5.278	Theta star (bias corrected MLE)	5.252
nu hat (MLE)	44	nu star (bias corrected)	44.21
MLE Mean (bias corrected)	0.984	MLE Sd (bias corrected)	2.273
		Adjusted Level of Significance (β)	0.048
Approximate Chi Square Value (44.21, α)	29.96	Adjusted Chi Square Value (44.21, β)	29.82
95% Gamma Approximate UCL (use when n>=50)	1.452	95% Gamma Adjusted UCL (use when n<50)	1.459
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.121	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.979	Mean in Log Scale	-7.588
SD in Original Scale	6.831	SD in Log Scale	4.421
95% t UCL (assumes normality of ROS data)	2.021	95% Percentile Bootstrap UCL	2.266
95% BCA Bootstrap UCL	3.023	95% Bootstrap t UCL	6.444
95% H-UCL (Log ROS)	130.8		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-5.707	95% H-UCL (KM -Log)	0.261
KM SD (logged)	2.6	95% Critical H Value (KM-Log)	4.101
KM Standard Error of Mean (logged)	0.264		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.272	Mean in Log Scale	-3.566
SD in Original Scale	6.847	SD in Log Scale	2.887
95% t UCL (Assumes normality)	2.317	95% H-Stat UCL	6.029
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	2.054	95% GROS Approximate Gamma UCL	1.452
95% Approximate Gamma KM-UCL	4.295		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|benzo(a) anthracene|)			
General Statistics			
Total Number of Observations	58	Number of Distinct Observations	24
Number of Detects	11	Number of Non-Detects	47
Number of Distinct Detects	9	Number of Distinct Non-Detects	15
Minimum Detect	0.047	Minimum Non-Detect	0.02
Maximum Detect	0.22	Maximum Non-Detect	6.6
Variance Detects	0.00302	Percent Non-Detects	81.03%
Mean Detects	0.112	SD Detects	0.055
Median Detects	0.11	CV Detects	0.493
Skewness Detects	1.021	Kurtosis Detects	0.525
Mean of Logged Detects	-2.3	SD of Logged Detects	0.486

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0425	Standard Error of Mean	0.00716
SD	0.0463	95% KM (BCA) UCL	0.0542
95% KM (t) UCL	0.0545	95% KM (Percentile Bootstrap) UCL	0.0546
95% KM (z) UCL	0.0543	95% KM Bootstrap t UCL	0.0568
90% KM Chebyshev UCL	0.064	95% KM Chebyshev UCL	0.0737
97.5% KM Chebyshev UCL	0.0872	99% KM Chebyshev UCL	0.114
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.345	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.195	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.855	k star (bias corrected MLE)	3.592
Theta hat (MLE)	0.023	Theta star (bias corrected MLE)	0.031
nu hat (MLE)	106.8	nu star (bias corrected)	79.02
MLE Mean (bias corrected)	0.112	MLE Sd (bias corrected)	0.0588
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.843	nu hat (KM)	97.78
Approximate Chi Square Value (97.78, α)	75.97	Adjusted Chi Square Value (97.78, β)	75.48
95% Gamma Approximate KM-UCL (use when n>=50)	0.0547	95% Gamma Adjusted KM-UCL (use when n<50)	0.0551
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0317
Maximum	0.22	Median	0.01
SD	0.0457	CV	1.442
k hat (MLE)	1.002	k star (bias corrected MLE)	0.962
Theta hat (MLE)	0.0317	Theta star (bias corrected MLE)	0.033
nu hat (MLE)	116.2	nu star (bias corrected)	111.5

MLE Mean (bias corrected)	0.0317	MLE Sd (bias corrected)	0.0323
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (111.54, α)	88.16	Adjusted Chi Square Value (111.54, β)	87.63
95% Gamma Approximate UCL (use when n>=50)	0.0401	95% Gamma Adjusted UCL (use when n<50)	0.0404
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0416	Mean in Log Scale	-3.521
SD in Original Scale	0.0426	SD in Log Scale	0.79
95% t UCL (assumes normality of ROS data)	0.0509	95% Percentile Bootstrap UCL	0.0507
95% BCA Bootstrap UCL	0.0533	95% Bootstrap t UCL	0.0543
95% H-UCL (Log ROS)	0.0504		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.509	95% H-UCL (KM -Log)	0.0476
KM SD (logged)	0.728	95% Critical H Value (KM-Log)	2.064
KM Standard Error of Mean (logged)	0.115		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.16	Mean in Log Scale	-3.173
SD in Original Scale	0.48	SD in Log Scale	1.415
95% t UCL (Assumes normality)	0.266	95% H-Stat UCL	0.201
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0545	95% KM (Percentile Bootstrap) UCL	0.0546
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|benzo(a) pyrene|)			
General Statistics			

Total Number of Observations	58	Number of Distinct Observations	25
Number of Detects	13	Number of Non-Detects	45
Number of Distinct Detects	11	Number of Distinct Non-Detects	15
Minimum Detect	0.043	Minimum Non-Detect	0.02
Maximum Detect	1.7	Maximum Non-Detect	6.6
Variance Detects	0.192	Percent Non-Detects	77.59%
Mean Detects	0.261	SD Detects	0.438
Median Detects	0.14	CV Detects	1.681
Skewness Detects	3.45	Kurtosis Detects	12.19
Mean of Logged Detects	-1.903	SD of Logged Detects	0.926
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.457	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.424	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0806	Standard Error of Mean	0.0318
SD	0.227	95% KM (BCA) UCL	0.141
95% KM (t) UCL	0.134	95% KM (Percentile Bootstrap) UCL	0.139
95% KM (z) UCL	0.133	95% KM Bootstrap t UCL	0.241
90% KM Chebyshev UCL	0.176	95% KM Chebyshev UCL	0.219
97.5% KM Chebyshev UCL	0.279	99% KM Chebyshev UCL	0.397
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.335	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.757	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.294	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.243	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.031	k star (bias corrected MLE)	0.845
Theta hat (MLE)	0.253	Theta star (bias corrected MLE)	0.308
nu hat (MLE)	26.82	nu star (bias corrected)	21.96
MLE Mean (bias corrected)	0.261	MLE Sd (bias corrected)	0.283
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.126	nu hat (KM)	14.61
Approximate Chi Square Value (14.61, α)	6.994	Adjusted Chi Square Value (14.61, β)	6.86
95% Gamma Approximate KM-UCL (use when n>=50)	0.168	95% Gamma Adjusted KM-UCL (use when n<50)	0.172
Gamma ROS Statistics using Imputed Non-Detects			

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0662
Maximum	1.7	Median	0.01
SD	0.227	CV	3.43
k hat (MLE)	0.496	k star (bias corrected MLE)	0.481
Theta hat (MLE)	0.134	Theta star (bias corrected MLE)	0.137
nu hat (MLE)	57.48	nu star (bias corrected)	55.84
MLE Mean (bias corrected)	0.0662	MLE Sd (bias corrected)	0.0953
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (55.84, α)	39.67	Adjusted Chi Square Value (55.84, β)	39.32
95% Gamma Approximate UCL (use when n>=50)	0.0931	95% Gamma Adjusted UCL (use when n<50)	0.0939
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0694	Mean in Log Scale	-3.991
SD in Original Scale	0.226	SD in Log Scale	1.45
95% t UCL (assumes normality of ROS data)	0.119	95% Percentile Bootstrap UCL	0.126
95% BCA Bootstrap UCL	0.173	95% Bootstrap t UCL	0.239
95% H-UCL (Log ROS)	0.0953		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.366	95% H-UCL (KM -Log)	0.0757
KM SD (logged)	0.982	95% Critical H Value (KM-Log)	2.321
KM Standard Error of Mean (logged)	0.146		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.19	Mean in Log Scale	-3.102
SD in Original Scale	0.521	SD in Log Scale	1.508
95% t UCL (Assumes normality)	0.305	95% H-Stat UCL	0.262
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			

95% KM (t) UCL	0.134	95% KM (% Bootstrap) UCL	0.139

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|0-10|benzo(b) fluoranthene|)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	27
Number of Detects	14	Number of Non-Detects	44
Number of Distinct Detects	13	Number of Distinct Non-Detects	15
Minimum Detect	0.027	Minimum Non-Detect	0.02
Maximum Detect	2	Maximum Non-Detect	6.6
Variance Detects	0.258	Percent Non-Detects	75.86%
Mean Detects	0.25	SD Detects	0.508
Median Detects	0.115	CV Detects	2.032
Skewness Detects	3.647	Kurtosis Detects	13.49
Mean of Logged Detects	-2.117	SD of Logged Detects	1.023

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.408	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.428	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0813	Standard Error of Mean	0.0367
SD	0.264	95% KM (BCA) UCL	0.154
95% KM (t) UCL	0.143	95% KM (Percentile Bootstrap) UCL	0.151
95% KM (z) UCL	0.142	95% KM Bootstrap t UCL	0.331
90% KM Chebyshev UCL	0.191	95% KM Chebyshev UCL	0.241
97.5% KM Chebyshev UCL	0.311	99% KM Chebyshev UCL	0.447

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.632	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.768	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.316	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.237	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.812	k star (bias corrected MLE)	0.686

Theta hat (MLE)	0.308	Theta star (bias corrected MLE)	0.364
nu hat (MLE)	22.74	nu star (bias corrected)	19.2
MLE Mean (bias corrected)	0.25	MLE Sd (bias corrected)	0.302
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.095	nu hat (KM)	11.02
Approximate Chi Square Value (11.02, α)	4.587	Adjusted Chi Square Value (11.02, β)	4.481
95% Gamma Approximate KM-UCL (use when n>=50)	0.195	95% Gamma Adjusted KM-UCL (use when n<50)	0.2
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0679
Maximum	2	Median	0.01
SD	0.264	CV	3.883
k hat (MLE)	0.485	k star (bias corrected MLE)	0.472
Theta hat (MLE)	0.14	Theta star (bias corrected MLE)	0.144
nu hat (MLE)	56.31	nu star (bias corrected)	54.73
MLE Mean (bias corrected)	0.0679	MLE Sd (bias corrected)	0.0988
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (54.73, α)	38.73	Adjusted Chi Square Value (54.73, β)	38.39
95% Gamma Approximate UCL (use when n>=50)	0.0959	95% Gamma Adjusted UCL (use when n<50)	0.0968
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.068	Mean in Log Scale	-4.263
SD in Original Scale	0.264	SD in Log Scale	1.556
95% t UCL (assumes normality of ROS data)	0.126	95% Percentile Bootstrap UCL	0.136
95% BCA Bootstrap UCL	0.18	95% Bootstrap t UCL	0.323
95% H-UCL (Log ROS)	0.0912		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.386	95% H-UCL (KM -Log)	0.07
KM SD (logged)	0.942	95% Critical H Value (KM-Log)	2.273
KM Standard Error of Mean (logged)	0.139		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.188	Mean in Log Scale	-3.161
SD in Original Scale	0.538	SD in Log Scale	1.481
95% t UCL (Assumes normality)	0.306	95% H-Stat UCL	0.233
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.154		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|benzo(g,h,i) perylene|)			
General Statistics			
Total Number of Observations	58	Number of Distinct Observations	24
Number of Detects	11	Number of Non-Detects	47
Number of Distinct Detects	11	Number of Distinct Non-Detects	14
Minimum Detect	0.024	Minimum Non-Detect	0.02
Maximum Detect	2.4	Maximum Non-Detect	6.6
Variance Detects	0.469	Percent Non-Detects	81.03%
Mean Detects	0.346	SD Detects	0.685
Median Detects	0.18	CV Detects	1.98
Skewness Detects	3.251	Kurtosis Detects	10.69
Mean of Logged Detects	-1.909	SD of Logged Detects	1.206
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.441	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.482	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0879	Standard Error of Mean	0.0446
SD	0.317	95% KM (BCA) UCL	0.182
95% KM (t) UCL	0.162	95% KM (Percentile Bootstrap) UCL	0.17
95% KM (z) UCL	0.161	95% KM Bootstrap t UCL	0.39
90% KM Chebyshev UCL	0.222	95% KM Chebyshev UCL	0.282

97.5% KM Chebyshev UCL	0.366	99% KM Chebyshev UCL	0.531
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.356	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.765	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.387	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.266	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.712	k star (bias corrected MLE)	0.578
Theta hat (MLE)	0.486	Theta star (bias corrected MLE)	0.598
nu hat (MLE)	15.66	nu star (bias corrected)	12.72
MLE Mean (bias corrected)	0.346	MLE Sd (bias corrected)	0.455
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0768	nu hat (KM)	8.911
Approximate Chi Square Value (8.91, α)	3.273	Adjusted Chi Square Value (8.91, β)	3.186
95% Gamma Approximate KM-UCL (use when n>=50)	0.239	95% Gamma Adjusted KM-UCL (use when n<50)	0.246
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0737
Maximum	2.4	Median	0.01
SD	0.316	CV	4.288
k hat (MLE)	0.437	k star (bias corrected MLE)	0.425
Theta hat (MLE)	0.169	Theta star (bias corrected MLE)	0.173
nu hat (MLE)	50.64	nu star (bias corrected)	49.36
MLE Mean (bias corrected)	0.0737	MLE Sd (bias corrected)	0.113
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (49.36, α)	34.23	Adjusted Chi Square Value (49.36, β)	33.91
95% Gamma Approximate UCL (use when n>=50)	0.106	95% Gamma Adjusted UCL (use when n<50)	0.107
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.281	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			

Mean in Original Scale	0.0713	Mean in Log Scale	-4.873
SD in Original Scale	0.317	SD in Log Scale	1.9
95% t UCL (assumes normality of ROS data)	0.141	95% Percentile Bootstrap UCL	0.152
95% BCA Bootstrap UCL	0.201	95% Bootstrap t UCL	0.394
95% H-UCL (Log ROS)	0.117		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.45	95% H-UCL (KM -Log)	0.0686
KM SD (logged)	0.972	95% Critical H Value (KM-Log)	2.309
KM Standard Error of Mean (logged)	0.144		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.2	Mean in Log Scale	-3.101
SD in Original Scale	0.563	SD in Log Scale	1.501
95% t UCL (Assumes normality)	0.324	95% H-Stat UCL	0.258
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.182		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|benzo(k) fluoranthene|)			
General Statistics			
Total Number of Observations	58	Number of Distinct Observations	24
Number of Detects	11	Number of Non-Detects	47
Number of Distinct Detects	10	Number of Distinct Non-Detects	15
Minimum Detect	0.035	Minimum Non-Detect	0.02
Maximum Detect	0.19	Maximum Non-Detect	6.6
Variance Detects	0.00235	Percent Non-Detects	81.03%
Mean Detects	0.0955	SD Detects	0.0485
Median Detects	0.094	CV Detects	0.508
Skewness Detects	0.865	Kurtosis Detects	0.314
Mean of Logged Detects	-2.469	SD of Logged Detects	0.525
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**	

5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0388	Standard Error of Mean	0.00609
SD	0.0392	95% KM (BCA) UCL	0.0512
95% KM (t) UCL	0.049	95% KM (Percentile Bootstrap) UCL	0.0491
95% KM (z) UCL	0.0489	95% KM Bootstrap t UCL	0.0523
90% KM Chebyshev UCL	0.0571	95% KM Chebyshev UCL	0.0654
97.5% KM Chebyshev UCL	0.0769	99% KM Chebyshev UCL	0.0995
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.254	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.141	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.325	k star (bias corrected MLE)	3.206
Theta hat (MLE)	0.0221	Theta star (bias corrected MLE)	0.0298
nu hat (MLE)	95.15	nu star (bias corrected)	70.54
MLE Mean (bias corrected)	0.0955	MLE Sd (bias corrected)	0.0533
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.983	nu hat (KM)	114
Approximate Chi Square Value (114.00, α)	90.35	Adjusted Chi Square Value (114.00, β)	89.81
95% Gamma Approximate KM-UCL (use when n>=50)	0.049	95% Gamma Adjusted KM-UCL (use when n<50)	0.0493
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0285
Maximum	0.19	Median	0.01
SD	0.0389	CV	1.364
k hat (MLE)	1.133	k star (bias corrected MLE)	1.086
Theta hat (MLE)	0.0252	Theta star (bias corrected MLE)	0.0263
nu hat (MLE)	131.4	nu star (bias corrected)	125.9
MLE Mean (bias corrected)	0.0285	MLE Sd (bias corrected)	0.0274
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (125.93, α)	101	Adjusted Chi Square Value (125.93, β)	100.4

95% Gamma Approximate UCL (use when n>=50)	0.0356	95% Gamma Adjusted UCL (use when n<50)	0.0358
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.128	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0351	Mean in Log Scale	-3.705
SD in Original Scale	0.0369	SD in Log Scale	0.805
95% t UCL (assumes normality of ROS data)	0.0432	95% Percentile Bootstrap UCL	0.0435
95% BCA Bootstrap UCL	0.0453	95% Bootstrap t UCL	0.0476
95% H-UCL (Log ROS)	0.0427		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.544	95% H-UCL (KM -Log)	0.0431
KM SD (logged)	0.668	95% Critical H Value (KM-Log)	2.012
KM Standard Error of Mean (logged)	0.106		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.157	Mean in Log Scale	-3.205
SD in Original Scale	0.481	SD in Log Scale	1.399
95% t UCL (Assumes normality)	0.263	95% H-Stat UCL	0.188
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.049	95% KM (Percentile Bootstrap) UCL	0.0491
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|bis(2-ethylhexyl)phthalate|)			
General Statistics			
Total Number of Observations	20	Number of Distinct Observations	14
Number of Detects	7	Number of Non-Detects	13
Number of Distinct Detects	7	Number of Distinct Non-Detects	7

Minimum Detect	0.0683	Minimum Non-Detect	0.067
Maximum Detect	5.6	Maximum Non-Detect	6.6
Variance Detects	4.638	Percent Non-Detects	65%
Mean Detects	1.661	SD Detects	2.154
Median Detects	0.467	CV Detects	1.297
Skewness Detects	1.352	Kurtosis Detects	0.571
Mean of Logged Detects	-0.513	SD of Logged Detects	1.733
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.784	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.674	Standard Error of Mean	0.355
SD	1.428	95% KM (BCA) UCL	1.376
95% KM (t) UCL	1.287	95% KM (Percentile Bootstrap) UCL	1.262
95% KM (z) UCL	1.257	95% KM Bootstrap t UCL	2.67
90% KM Chebyshev UCL	1.738	95% KM Chebyshev UCL	2.219
97.5% KM Chebyshev UCL	2.888	99% KM Chebyshev UCL	4.201
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.331	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.212	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.325	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.605	k star (bias corrected MLE)	0.441
Theta hat (MLE)	2.748	Theta star (bias corrected MLE)	3.769
nu hat (MLE)	8.464	nu star (bias corrected)	6.17
MLE Mean (bias corrected)	1.661	MLE Sd (bias corrected)	2.502
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.223	nu hat (KM)	8.918
Approximate Chi Square Value (8.92, α)	3.277	Adjusted Chi Square Value (8.92, β)	3.012
95% Gamma Approximate KM-UCL (use when n>=50)	1.835	95% Gamma Adjusted KM-UCL (use when n<50)	1.996
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.614
Maximum	5.6	Median	0.01
SD	1.449	CV	2.362
k hat (MLE)	0.28	k star (bias corrected MLE)	0.272
Theta hat (MLE)	2.188	Theta star (bias corrected MLE)	2.258
nu hat (MLE)	11.22	nu star (bias corrected)	10.87
MLE Mean (bias corrected)	0.614	MLE Sd (bias corrected)	1.177
		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (10.87, α)	4.49	Adjusted Chi Square Value (10.87, β)	4.17
95% Gamma Approximate UCL (use when n>=50)	1.485	95% Gamma Adjusted UCL (use when n<50)	1.599
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.626	Mean in Log Scale	-2.306
SD in Original Scale	1.441	SD in Log Scale	1.907
95% t UCL (assumes normality of ROS data)	1.183	95% Percentile Bootstrap UCL	1.21
95% BCA Bootstrap UCL	1.384	95% Bootstrap t UCL	2.843
95% H-UCL (Log ROS)	3.758		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-1.778	95% H-UCL (KM -Log)	1.374
KM SD (logged)	1.426	95% Critical H Value (KM-Log)	3.301
KM Standard Error of Mean (logged)	0.37		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.862	Mean in Log Scale	-1.269
SD in Original Scale	1.518	SD in Log Scale	1.462
95% t UCL (Assumes normality)	1.449	95% H-Stat UCL	2.525
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	1.287	95% KM (Percentile Bootstrap) UCL	1.262
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			

Appendix C - ProUCL Output

Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|chrysene|)			
General Statistics			
Total Number of Observations	58	Number of Distinct Observations	23
Number of Detects	12	Number of Non-Detects	46
Number of Distinct Detects	9	Number of Distinct Non-Detects	15
Minimum Detect	0.052	Minimum Non-Detect	0.02
Maximum Detect	1	Maximum Non-Detect	6.6
Variance Detects	0.0662	Percent Non-Detects	79.31%
Mean Detects	0.21	SD Detects	0.257
Median Detects	0.15	CV Detects	1.223
Skewness Detects	3.07	Kurtosis Detects	10.01
Mean of Logged Detects	-1.925	SD of Logged Detects	0.795
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.565	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.355	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0657	Standard Error of Mean	0.02
SD	0.14	95% KM (BCA) UCL	0.106
95% KM (t) UCL	0.0991	95% KM (Percentile Bootstrap) UCL	0.0998
95% KM (z) UCL	0.0986	95% KM Bootstrap t UCL	0.138
90% KM Chebyshev UCL	0.126	95% KM Chebyshev UCL	0.153
97.5% KM Chebyshev UCL	0.19	99% KM Chebyshev UCL	0.264
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.857	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.24	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.25	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.51	k star (bias corrected MLE)	1.188
Theta hat (MLE)	0.139	Theta star (bias corrected MLE)	0.177
nu hat (MLE)	36.24	nu star (bias corrected)	28.51
MLE Mean (bias corrected)	0.21	MLE Sd (bias corrected)	0.193

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.22	nu hat (KM)	25.56
Approximate Chi Square Value (25.56, α)	15.04	Adjusted Chi Square Value (25.56, β)	14.83
95% Gamma Approximate KM-UCL (use when n>=50)	0.112	95% Gamma Adjusted KM-UCL (use when n<50)	0.113
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0515
Maximum	1	Median	0.01
SD	0.14	CV	2.712
k hat (MLE)	0.574	k star (bias corrected MLE)	0.556
Theta hat (MLE)	0.0897	Theta star (bias corrected MLE)	0.0926
nu hat (MLE)	66.57	nu star (bias corrected)	64.46
MLE Mean (bias corrected)	0.0515	MLE Sd (bias corrected)	0.069
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (64.46, α)	46.99	Adjusted Chi Square Value (64.46, β)	46.61
95% Gamma Approximate UCL (use when n>=50)	0.0706	95% Gamma Adjusted UCL (use when n<50)	0.0712
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0572	Mean in Log Scale	-3.832
SD in Original Scale	0.138	SD in Log Scale	1.268
95% t UCL (assumes normality of ROS data)	0.0876	95% Percentile Bootstrap UCL	0.091
95% BCA Bootstrap UCL	0.109	95% Bootstrap t UCL	0.132
95% H-UCL (Log ROS)	0.0777		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.407	95% H-UCL (KM -Log)	0.0672
KM SD (logged)	0.927	95% Critical H Value (KM-Log)	2.255
KM Standard Error of Mean (logged)	0.14		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.177	Mean in Log Scale	-3.116
SD in Original Scale	0.492	SD in Log Scale	1.479

95% t UCL (Assumes normality)	0.285	95% H-Stat UCL	0.243

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0991	95% GROS Approximate Gamma UCL	0.0706
95% Approximate Gamma KM-UCL	0.112		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|0-10|dibenz(a,h) anthracene|)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	17
Number of Detects	2	Number of Non-Detects	56
Number of Distinct Detects	2	Number of Distinct Non-Detects	15
Minimum Detect	0.022	Minimum Non-Detect	0.02
Maximum Detect	0.035	Maximum Non-Detect	8.4
Variance Detects	8.4500E-5	Percent Non-Detects	96.55%
Mean Detects	0.0285	SD Detects	0.00919
Median Detects	0.0285	CV Detects	0.323
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.585	SD of Logged Detects	0.328

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0207	Standard Error of Mean	8.3815E-4
SD	0.00295	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0221	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0221	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0232	95% KM Chebyshev UCL	0.0244
97.5% KM Chebyshev UCL	0.0259	99% KM Chebyshev UCL	0.029

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	18.89	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00151	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	75.54	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	49.2	nu hat (KM)	5708
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (N/A, α)	5533	Adjusted Chi Square Value (N/A, β)	5529
95% Gamma Approximate KM-UCL (use when n>=50)	0.0214	95% Gamma Adjusted KM-UCL (use when n<50)	0.0214
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00754	Mean in Log Scale	-5.072
SD in Original Scale	0.00539	SD in Log Scale	0.598
95% t UCL (assumes normality of ROS data)	0.00872	95% Percentile Bootstrap UCL	0.00871
95% BCA Bootstrap UCL	0.00907	95% Bootstrap t UCL	0.00912
95% H-UCL (Log ROS)	0.00875		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.163	Mean in Log Scale	-3.396
SD in Original Scale	0.609	SD in Log Scale	1.354
95% t UCL (Assumes normality)	0.297	95% H-Stat UCL	0.142
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0221	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|diethyl phthalate|)			

Appendix C - ProUCL Output

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	14
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	4	Number of Distinct Non-Detects	10
Minimum Detect	0.0595	Minimum Non-Detect	0.056
Maximum Detect	0.0788	Maximum Non-Detect	6.6
Variance Detects	8.3229E-5	Percent Non-Detects	80%
Mean Detects	0.0696	SD Detects	0.00912
Median Detects	0.07	CV Detects	0.131
Skewness Detects	-0.138	Kurtosis Detects	-4.078
Mean of Logged Detects	-2.672	SD of Logged Detects	0.133
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0651	Standard Error of Mean	0.00428
SD	0.00909	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0725	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0721	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0779	95% KM Chebyshev UCL	0.0837
97.5% KM Chebyshev UCL	0.0918	99% KM Chebyshev UCL	0.108
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.344	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.281	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	76.61	k star (bias corrected MLE)	19.32
Theta hat (MLE)	9.0814E-4	Theta star (bias corrected MLE)	0.0036
nu hat (MLE)	612.9	nu star (bias corrected)	154.6
MLE Mean (bias corrected)	0.0696	MLE Sd (bias corrected)	0.0158
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	51.25	nu hat (KM)	2050
Approximate Chi Square Value (N/A, α)	1946	Adjusted Chi Square Value (N/A, β)	1938
95% Gamma Approximate KM-UCL (use when n>=50)	0.0685	95% Gamma Adjusted KM-UCL (use when n<50)	0.0688

Appendix C - ProUCL Output

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0461	Mean	0.0616
Maximum	0.0788	Median	0.0615
SD	0.00948	CV	0.154
k hat (MLE)	43.68	k star (bias corrected MLE)	37.16
Theta hat (MLE)	0.00141	Theta star (bias corrected MLE)	0.00166
nu hat (MLE)	1747	nu star (bias corrected)	1486
MLE Mean (bias corrected)	0.0616	MLE Sd (bias corrected)	0.0101
		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (N/A, α)	1398	Adjusted Chi Square Value (N/A, β)	1391
95% Gamma Approximate UCL (use when n>=50)	0.0655	95% Gamma Adjusted UCL (use when n<50)	N/A
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.062	Mean in Log Scale	-2.791
SD in Original Scale	0.00885	SD in Log Scale	0.143
95% t UCL (assumes normality of ROS data)	0.0654	95% Percentile Bootstrap UCL	0.0651
95% BCA Bootstrap UCL	0.0652	95% Bootstrap t UCL	0.0656
95% H-UCL (Log ROS)	0.0657		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.742	95% H-UCL (KM -Log)	0.0687
KM SD (logged)	0.136	95% Critical H Value (KM-Log)	1.751
KM Standard Error of Mean (logged)	0.0643		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.369	Mean in Log Scale	-2.072
SD in Original Scale	0.782	SD in Log Scale	1.276
95% t UCL (Assumes normality)	0.672	95% H-Stat UCL	0.696
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Appendix C - ProUCL Output

Suggested UCL to Use			
95% KM (t) UCL	0.0725	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|0-10|ethyl-benzene|)

General Statistics			
Total Number of Observations	118	Number of Distinct Observations	44
Number of Detects	47	Number of Non-Detects	71
Number of Distinct Detects	40	Number of Distinct Non-Detects	4
Minimum Detect	8.4000E-4	Minimum Non-Detect	9.9000E-4
Maximum Detect	270	Maximum Non-Detect	2.5
Variance Detects	1856	Percent Non-Detects	60.17%
Mean Detects	19.09	SD Detects	43.09
Median Detects	4.2	CV Detects	2.257
Skewness Detects	4.645	Kurtosis Detects	25.61
Mean of Logged Detects	0.697	SD of Logged Detects	2.935

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.479	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.946	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.129	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	7.606	Standard Error of Mean	2.65
SD	28.48	95% KM (BCA) UCL	12.32
95% KM (t) UCL	12	95% KM (Percentile Bootstrap) UCL	12.4
95% KM (z) UCL	11.97	95% KM Bootstrap t UCL	16.57
90% KM Chebyshev UCL	15.56	95% KM Chebyshev UCL	19.16
97.5% KM Chebyshev UCL	24.15	99% KM Chebyshev UCL	33.97

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.337	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.861	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0726	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.14	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.305	k star (bias corrected MLE)	0.3
Theta hat (MLE)	62.51	Theta star (bias corrected MLE)	63.62
nu hat (MLE)	28.7	nu star (bias corrected)	28.2
MLE Mean (bias corrected)	19.09	MLE Sd (bias corrected)	34.85
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0713	nu hat (KM)	16.84
Approximate Chi Square Value (16.84, α)	8.556	Adjusted Chi Square Value (16.84, β)	8.483
95% Gamma Approximate KM-UCL (use when n>=50)	14.97	95% Gamma Adjusted KM-UCL (use when n<50)	15.1
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	8.4000E-4	Mean	7.609
Maximum	270	Median	0.01
SD	28.6	CV	3.759
k hat (MLE)	0.167	k star (bias corrected MLE)	0.169
Theta hat (MLE)	45.49	Theta star (bias corrected MLE)	45.12
nu hat (MLE)	39.47	nu star (bias corrected)	39.8
MLE Mean (bias corrected)	7.609	MLE Sd (bias corrected)	18.53
		Adjusted Level of Significance (β)	0.048
Approximate Chi Square Value (39.80, α)	26.35	Adjusted Chi Square Value (39.80, β)	26.21
95% Gamma Approximate UCL (use when n>=50)	11.49	95% Gamma Adjusted UCL (use when n<50)	11.55
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.946	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.133	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.129	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	7.61	Mean in Log Scale	-3.725
SD in Original Scale	28.6	SD in Log Scale	4.629
95% t UCL (assumes normality of ROS data)	11.97	95% Percentile Bootstrap UCL	12.14
95% BCA Bootstrap UCL	15.11	95% Bootstrap t UCL	17.14
95% H-UCL (Log ROS)	20496		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	7.648	Mean in Log Scale	-2.82

SD in Original Scale	28.59	SD in Log Scale	3.73
95% t UCL (Assumes normality)	12.01	95% H-Stat UCL	435.1
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	12	95% GROS Approximate Gamma UCL	11.49
95% Approximate Gamma KM-UCL	14.97		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|fluoranthene|)			
General Statistics			
Total Number of Observations	58	Number of Distinct Observations	26
Number of Detects	13	Number of Non-Detects	45
Number of Distinct Detects	12	Number of Distinct Non-Detects	15
Minimum Detect	0.054	Minimum Non-Detect	0.02
Maximum Detect	1.4	Maximum Non-Detect	6.6
Variance Detects	0.126	Percent Non-Detects	77.59%
Mean Detects	0.274	SD Detects	0.355
Median Detects	0.17	CV Detects	1.296
Skewness Detects	3.078	Kurtosis Detects	10.13
Mean of Logged Detects	-1.711	SD of Logged Detects	0.845
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.568	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.351	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0835	Standard Error of Mean	0.0276
SD	0.197	95% KM (BCA) UCL	0.134
95% KM (t) UCL	0.13	95% KM (Percentile Bootstrap) UCL	0.135
95% KM (z) UCL	0.129	95% KM Bootstrap t UCL	0.19
90% KM Chebyshev UCL	0.166	95% KM Chebyshev UCL	0.204
97.5% KM Chebyshev UCL	0.256	99% KM Chebyshev UCL	0.358

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.912	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.752	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.289	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.242	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.347	k star (bias corrected MLE)	1.088
Theta hat (MLE)	0.203	Theta star (bias corrected MLE)	0.252
nu hat (MLE)	35.03	nu star (bias corrected)	28.28
MLE Mean (bias corrected)	0.274	MLE Sd (bias corrected)	0.262
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.18	nu hat (KM)	20.89
Approximate Chi Square Value (20.89, α)	11.51	Adjusted Chi Square Value (20.89, β)	11.33
95% Gamma Approximate KM-UCL (use when n>=50)	0.152	95% Gamma Adjusted KM-UCL (use when n<50)	0.154
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0691
Maximum	1.4	Median	0.01
SD	0.197	CV	2.851
k hat (MLE)	0.495	k star (bias corrected MLE)	0.481
Theta hat (MLE)	0.14	Theta star (bias corrected MLE)	0.144
nu hat (MLE)	57.46	nu star (bias corrected)	55.82
MLE Mean (bias corrected)	0.0691	MLE Sd (bias corrected)	0.0996
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (55.82, α)	39.65	Adjusted Chi Square Value (55.82, β)	39.3
95% Gamma Approximate UCL (use when n>=50)	0.0973	95% Gamma Adjusted UCL (use when n<50)	0.0981
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.222	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0755	Mean in Log Scale	-3.712
SD in Original Scale	0.195	SD in Log Scale	1.371
95% t UCL (assumes normality of ROS data)	0.118	95% Percentile Bootstrap UCL	0.124

95% BCA Bootstrap UCL	0.152	95% Bootstrap t UCL	0.187
95% H-UCL (Log ROS)	0.107		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.331	95% H-UCL (KM -Log)	0.0851
KM SD (logged)	1.037	95% Critical H Value (KM-Log)	2.396
KM Standard Error of Mean (logged)	0.153		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.191	Mean in Log Scale	-3.075
SD in Original Scale	0.508	SD in Log Scale	1.523
95% t UCL (Assumes normality)	0.302	95% H-Stat UCL	0.278
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.13	95% KM (% Bootstrap) UCL	0.135
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|indeno(1,2,3-c,d) pyrene|)			
General Statistics			
Total Number of Observations	58	Number of Distinct Observations	21
Number of Detects	9	Number of Non-Detects	49
Number of Distinct Detects	7	Number of Distinct Non-Detects	14
Minimum Detect	0.025	Minimum Non-Detect	0.02
Maximum Detect	1.7	Maximum Non-Detect	6.6
Variance Detects	0.285	Percent Non-Detects	84.48%
Mean Detects	0.281	SD Detects	0.534
Median Detects	0.12	CV Detects	1.9
Skewness Detects	2.96	Kurtosis Detects	8.825
Mean of Logged Detects	-2.085	SD of Logged Detects	1.155
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.469	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.486	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0656	Standard Error of Mean	0.0318
SD	0.224	95% KM (BCA) UCL	0.128
95% KM (t) UCL	0.119	95% KM (Percentile Bootstrap) UCL	0.126
95% KM (z) UCL	0.118	95% KM Bootstrap t UCL	0.29
90% KM Chebyshev UCL	0.161	95% KM Chebyshev UCL	0.204
97.5% KM Chebyshev UCL	0.264	99% KM Chebyshev UCL	0.382
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.341	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.421	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.29	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.736	k star (bias corrected MLE)	0.565
Theta hat (MLE)	0.382	Theta star (bias corrected MLE)	0.498
nu hat (MLE)	13.24	nu star (bias corrected)	10.16
MLE Mean (bias corrected)	0.281	MLE Sd (bias corrected)	0.374
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0861	nu hat (KM)	9.983
Approximate Chi Square Value (9.98, α)	3.931	Adjusted Chi Square Value (9.98, β)	3.834
95% Gamma Approximate KM-UCL (use when n>=50)	0.167	95% Gamma Adjusted KM-UCL (use when n<50)	0.171
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0521
Maximum	1.7	Median	0.01
SD	0.223	CV	4.288
k hat (MLE)	0.504	k star (bias corrected MLE)	0.489
Theta hat (MLE)	0.103	Theta star (bias corrected MLE)	0.106
nu hat (MLE)	58.47	nu star (bias corrected)	56.78
MLE Mean (bias corrected)	0.0521	MLE Sd (bias corrected)	0.0744
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (56.78, α)	40.46	Adjusted Chi Square Value (56.78, β)	40.11
95% Gamma Approximate UCL (use when n>=50)	0.073	95% Gamma Adjusted UCL (use when n<50)	0.0737

Appendix C - ProUCL Output

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.324	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0485	Mean in Log Scale	-5.235
SD in Original Scale	0.224	SD in Log Scale	1.861
95% t UCL (assumes normality of ROS data)	0.0977	95% Percentile Bootstrap UCL	0.106
95% BCA Bootstrap UCL	0.145	95% Bootstrap t UCL	0.298
95% H-UCL (Log ROS)	0.0733		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.547	95% H-UCL (KM -Log)	0.0521
KM SD (logged)	0.839	95% Critical H Value (KM-Log)	2.166
KM Standard Error of Mean (logged)	0.129		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.18	Mean in Log Scale	-3.186
SD in Original Scale	0.521	SD in Log Scale	1.455
95% t UCL (Assumes normality)	0.295	95% H-Stat UCL	0.215
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.128		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|lead|)			
General Statistics			
Total Number of Observations	69	Number of Distinct Observations	63
		Number of Missing Observations	0
Minimum	5.4	Mean	631.1
Maximum	10000	Median	73.2

SD	1481	Std. Error of Mean	178.3
Coefficient of Variation	2.347	Skewness	4.481
Normal GOF Test			
Shapiro Wilk Test Statistic	0.479	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.336	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.107	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	928.4	95% Adjusted-CLT UCL (Chen-1995)	1027
		95% Modified-t UCL (Johnson-1978)	944.4
Gamma GOF Test			
A-D Test Statistic	3.383	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.857	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.179	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.116	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.336	k star (bias corrected MLE)	0.331
Theta hat (MLE)	1876	Theta star (bias corrected MLE)	1904
nu hat (MLE)	46.42	nu star (bias corrected)	45.73
MLE Mean (bias corrected)	631.1	MLE Sd (bias corrected)	1096
		Approximate Chi Square Value (0.05)	31.22
Adjusted Level of Significance	0.0465	Adjusted Chi Square Value	30.96
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	924.5	95% Adjusted Gamma UCL (use when n<50)	932.1
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.5275E-6	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.107	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.686	Mean of logged Data	4.435
Maximum of Logged Data	9.21	SD of logged Data	2.192
Assuming Lognormal Distribution			

95% H-UCL	2088	90% Chebyshev (MVUE) UCL	1880
95% Chebyshev (MVUE) UCL	2352	97.5% Chebyshev (MVUE) UCL	3008
99% Chebyshev (MVUE) UCL	4296		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	924.3	95% Jackknife UCL	928.4
95% Standard Bootstrap UCL	918.9	95% Bootstrap-t UCL	1140
95% Hall's Bootstrap UCL	1926	95% Percentile Bootstrap UCL	940.9
95% BCA Bootstrap UCL	1108		
90% Chebyshev(Mean, Sd) UCL	1166	95% Chebyshev(Mean, Sd) UCL	1408
97.5% Chebyshev(Mean, Sd) UCL	1744	99% Chebyshev(Mean, Sd) UCL	2405

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	1408

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

Conc (|soil|0-10|mtbe|)

General Statistics

Total Number of Observations	22	Number of Distinct Observations	6
Number of Detects	2	Number of Non-Detects	20
Number of Distinct Detects	2	Number of Distinct Non-Detects	4
Minimum Detect	0.007	Minimum Non-Detect	0.005
Maximum Detect	7.7	Maximum Non-Detect	0.5
Variance Detects	29.59	Percent Non-Detects	90.91%
Mean Detects	3.854	SD Detects	5.44
Median Detects	3.854	CV Detects	1.412
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.46	SD of Logged Detects	4.952

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.355	Standard Error of Mean	0.483
SD	1.603	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.187	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.15	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.805	95% KM Chebyshev UCL	2.461
97.5% KM Chebyshev UCL	3.373	99% KM Chebyshev UCL	5.163
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.252	k star (bias corrected MLE)	N/A
Theta hat (MLE)	15.27	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1.01	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.049	nu hat (KM)	2.158
		Adjusted Level of Significance (β)	0.0386
Approximate Chi Square Value (2.16, α)	0.174	Adjusted Chi Square Value (2.16, β)	0.151
95% Gamma Approximate KM-UCL (use when n>=50)	4.4	95% Gamma Adjusted KM-UCL (use when n<50)	5.066
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.35	Mean in Log Scale	-18.34
SD in Original Scale	1.642	SD in Log Scale	8.443
95% t UCL (assumes normality of ROS data)	0.953	95% Percentile Bootstrap UCL	1.05
95% BCA Bootstrap UCL	1.401	95% Bootstrap t UCL	27157
95% H-UCL (Log ROS)	1.249E+21		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.423	Mean in Log Scale	-3.926
SD in Original Scale	1.629	SD in Log Scale	2.337
95% t UCL (Assumes normality)	1.021	95% H-Stat UCL	3.455
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
99% KM (Chebyshev) UCL	5.163		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|0-10|naphthalene|)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	16
Number of Detects	2	Number of Non-Detects	56
Number of Distinct Detects	2	Number of Distinct Non-Detects	15
Minimum Detect	0.02	Minimum Non-Detect	0.02
Maximum Detect	0.059	Maximum Non-Detect	6.6
Variance Detects	7.6050E-4	Percent Non-Detects	96.55%
Mean Detects	0.0395	SD Detects	0.0276
Median Detects	0.0395	CV Detects	0.698
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.371	SD of Logged Detects	0.765

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0213	Standard Error of Mean	0.00187
SD	0.00712	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0245	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0244	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.027	95% KM Chebyshev UCL	0.0295
97.5% KM Chebyshev UCL	0.033	99% KM Chebyshev UCL	0.0399

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.738	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0106	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	14.95	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	8.997	nu hat (KM)	1044
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (N/A, α)	969.6	Adjusted Chi Square Value (N/A, β)	967.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.023	95% Gamma Adjusted KM-UCL (use when n<50)	0.023
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00311	Mean in Log Scale	-6.823
SD in Original Scale	0.0081	SD in Log Scale	1.367
95% t UCL (assumes normality of ROS data)	0.00488	95% Percentile Bootstrap UCL	0.00494
95% BCA Bootstrap UCL	0.00625	95% Bootstrap t UCL	0.00915
95% H-UCL (Log ROS)	0.00474		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.153	Mean in Log Scale	-3.253
SD in Original Scale	0.481	SD in Log Scale	1.382
95% t UCL (Assumes normality)	0.259	95% H-Stat UCL	0.173
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0245	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|phenanthrene|)			
General Statistics			
Total Number of Observations	58	Number of Distinct Observations	22
Number of Detects	9	Number of Non-Detects	49
Number of Distinct Detects	8	Number of Distinct Non-Detects	15
Minimum Detect	0.048	Minimum Non-Detect	0.02
Maximum Detect	0.26	Maximum Non-Detect	6.6
Variance Detects	0.00598	Percent Non-Detects	84.48%
Mean Detects	0.141	SD Detects	0.0773
Median Detects	0.11	CV Detects	0.55

Skewness Detects	0.816	Kurtosis Detects	-0.803
Mean of Logged Detects	-2.095	SD of Logged Detects	0.554
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0446	Standard Error of Mean	0.00889
SD	0.0569	95% KM (BCA) UCL	0.062
95% KM (t) UCL	0.0595	95% KM (Percentile Bootstrap) UCL	0.06
95% KM (z) UCL	0.0592	95% KM Bootstrap t UCL	0.0632
90% KM Chebyshev UCL	0.0713	95% KM Chebyshev UCL	0.0834
97.5% KM Chebyshev UCL	0.1	99% KM Chebyshev UCL	0.133
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.463	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.22	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.281	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.892	k star (bias corrected MLE)	2.669
Theta hat (MLE)	0.0361	Theta star (bias corrected MLE)	0.0527
nu hat (MLE)	70.05	nu star (bias corrected)	48.03
MLE Mean (bias corrected)	0.141	MLE Sd (bias corrected)	0.0861
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.615	nu hat (KM)	71.3
Approximate Chi Square Value (71.30, α)	52.86	Adjusted Chi Square Value (71.30, β)	52.45
95% Gamma Approximate KM-UCL (use when n>=50)	0.0602	95% Gamma Adjusted KM-UCL (use when n<50)	0.0606
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0315
Maximum	0.26	Median	0.01
SD	0.0556	CV	1.766
k hat (MLE)	0.852	k star (bias corrected MLE)	0.82

Theta hat (MLE)	0.0369	Theta star (bias corrected MLE)	0.0384
nu hat (MLE)	98.88	nu star (bias corrected)	95.1
MLE Mean (bias corrected)	0.0315	MLE Sd (bias corrected)	0.0348
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (95.10, α)	73.61	Adjusted Chi Square Value (95.10, β)	73.13
95% Gamma Approximate UCL (use when n>=50)	0.0407	95% Gamma Adjusted UCL (use when n<50)	0.0409
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0417	Mean in Log Scale	-3.638
SD in Original Scale	0.053	SD in Log Scale	0.906
95% t UCL (assumes normality of ROS data)	0.0534	95% Percentile Bootstrap UCL	0.0539
95% BCA Bootstrap UCL	0.0576	95% Bootstrap t UCL	0.0587
95% H-UCL (Log ROS)	0.0518		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.526	95% H-UCL (KM -Log)	0.0487
KM SD (logged)	0.764	95% Critical H Value (KM-Log)	2.096
KM Standard Error of Mean (logged)	0.124		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.166	Mean in Log Scale	-3.071
SD in Original Scale	0.48	SD in Log Scale	1.407
95% t UCL (Assumes normality)	0.272	95% H-Stat UCL	0.219
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0595	95% KM (Percentile Bootstrap) UCL	0.06
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|pyrene|)			

General Statistics			
Total Number of Observations	58	Number of Distinct Observations	28
Number of Detects	15	Number of Non-Detects	43
Number of Distinct Detects	14	Number of Distinct Non-Detects	14
Minimum Detect	0.07	Minimum Non-Detect	0.02
Maximum Detect	1.6	Maximum Non-Detect	6.6
Variance Detects	0.143	Percent Non-Detects	74.14%
Mean Detects	0.315	SD Detects	0.378
Median Detects	0.23	CV Detects	1.198
Skewness Detects	3.168	Kurtosis Detects	10.97
Mean of Logged Detects	-1.52	SD of Logged Detects	0.803
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.582	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.348	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.229	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.104	Standard Error of Mean	0.0322
SD	0.231	95% KM (BCA) UCL	0.17
95% KM (t) UCL	0.158	95% KM (Percentile Bootstrap) UCL	0.16
95% KM (z) UCL	0.157	95% KM Bootstrap t UCL	0.207
90% KM Chebyshev UCL	0.201	95% KM Chebyshev UCL	0.245
97.5% KM Chebyshev UCL	0.305	99% KM Chebyshev UCL	0.425
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.827	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.754	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.264	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.225	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.512	k star (bias corrected MLE)	1.254
Theta hat (MLE)	0.209	Theta star (bias corrected MLE)	0.252
nu hat (MLE)	45.35	nu star (bias corrected)	37.61
MLE Mean (bias corrected)	0.315	MLE Sd (bias corrected)	0.282
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.205	nu hat (KM)	23.74
Approximate Chi Square Value (23.74, α)	13.65	Adjusted Chi Square Value (23.74, β)	13.46
95% Gamma Approximate KM-UCL (use when n>=50)	0.181	95% Gamma Adjusted KM-UCL (use when n<50)	0.184

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.089
Maximum	1.6	Median	0.01
SD	0.231	CV	2.594
k hat (MLE)	0.463	k star (bias corrected MLE)	0.451
Theta hat (MLE)	0.192	Theta star (bias corrected MLE)	0.197
nu hat (MLE)	53.72	nu star (bias corrected)	52.28
MLE Mean (bias corrected)	0.089	MLE Sd (bias corrected)	0.133
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (52.28, α)	36.67	Adjusted Chi Square Value (52.28, β)	36.34
95% Gamma Approximate UCL (use when n>=50)	0.127	95% Gamma Adjusted UCL (use when n<50)	0.128
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.101	Mean in Log Scale	-3.26
SD in Original Scale	0.227	SD in Log Scale	1.295
95% t UCL (assumes normality of ROS data)	0.151	95% Percentile Bootstrap UCL	0.155
95% BCA Bootstrap UCL	0.181	95% Bootstrap t UCL	0.22
95% H-UCL (Log ROS)	0.145		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.204	95% H-UCL (KM -Log)	0.118
KM SD (logged)	1.157	95% Critical H Value (KM-Log)	2.6
KM Standard Error of Mean (logged)	0.167		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.208	Mean in Log Scale	-3.002
SD in Original Scale	0.518	SD in Log Scale	1.587
95% t UCL (Assumes normality)	0.322	95% H-Stat UCL	0.346
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			

Suggested UCL to Use			
95% KM (t) UCL	0.158	95% KM (% Bootstrap) UCL	0.16

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|0-10|toluene|)

General Statistics			
Total Number of Observations	118	Number of Distinct Observations	19
Number of Detects	9	Number of Non-Detects	109
Number of Distinct Detects	9	Number of Distinct Non-Detects	11
Minimum Detect	8.4000E-4	Minimum Non-Detect	9.9000E-4
Maximum Detect	320	Maximum Non-Detect	10
Variance Detects	11073	Percent Non-Detects	92.37%
Mean Detects	44.6	SD Detects	105.2
Median Detects	2.7	CV Detects	2.359
Skewness Detects	2.809	Kurtosis Detects	8.044
Mean of Logged Detects	0.673	SD of Logged Detects	3.645
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.501	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.407	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	3.408	Standard Error of Mean	2.914
SD	29.85	95% KM (BCA) UCL	8.811
95% KM (t) UCL	8.24	95% KM (Percentile Bootstrap) UCL	8.473
95% KM (z) UCL	8.202	95% KM Bootstrap t UCL	108.8
90% KM Chebyshev UCL	12.15	95% KM Chebyshev UCL	16.11
97.5% KM Chebyshev UCL	21.61	99% KM Chebyshev UCL	32.41
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.465	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.835	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.247	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.306	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.23	k star (bias corrected MLE)	0.228
Theta hat (MLE)	193.7	Theta star (bias corrected MLE)	195.9
nu hat (MLE)	4.146	nu star (bias corrected)	4.097
MLE Mean (bias corrected)	44.6	MLE Sd (bias corrected)	93.49
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.013	nu hat (KM)	3.077
Approximate Chi Square Value (3.08, α)	0.396	Adjusted Chi Square Value (3.08, β)	0.385
95% Gamma Approximate KM-UCL (use when n>=50)	26.51	95% Gamma Adjusted KM-UCL (use when n<50)	27.21
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	8.4000E-4	Mean	3.411
Maximum	320	Median	0.01
SD	29.97	CV	8.787
k hat (MLE)	0.143	k star (bias corrected MLE)	0.145
Theta hat (MLE)	23.92	Theta star (bias corrected MLE)	23.59
nu hat (MLE)	33.65	nu star (bias corrected)	34.13
MLE Mean (bias corrected)	3.411	MLE Sd (bias corrected)	8.97
		Adjusted Level of Significance (β)	0.048
Approximate Chi Square Value (34.13, α)	21.77	Adjusted Chi Square Value (34.13, β)	21.65
95% Gamma Approximate UCL (use when n>=50)	5.348	95% Gamma Adjusted UCL (use when n<50)	5.378
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	3.419	Mean in Log Scale	-7.365
SD in Original Scale	29.97	SD in Log Scale	4.397
95% t UCL (assumes normality of ROS data)	7.994	95% Percentile Bootstrap UCL	8.802
95% BCA Bootstrap UCL	14.78	95% Bootstrap t UCL	106.2
95% H-UCL (Log ROS)	143		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-6.449	95% H-UCL (KM -Log)	0.0513
KM SD (logged)	2.316	95% Critical H Value (KM-Log)	3.731

KM Standard Error of Mean (logged)	0.233		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.68	Mean in Log Scale	-3.757
SD in Original Scale	29.95	SD in Log Scale	2.925
95% t UCL (Assumes normality)	8.252	95% H-Stat UCL	5.738
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	8.24	95% GROS Approximate Gamma UCL	5.348
95% Approximate Gamma KM-UCL	26.51		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|total xylenes|)			
General Statistics			
Total Number of Observations	118	Number of Distinct Observations	46
Number of Detects	42	Number of Non-Detects	76
Number of Distinct Detects	39	Number of Distinct Non-Detects	8
Minimum Detect	0.0015	Minimum Non-Detect	0.002
Maximum Detect	1400	Maximum Non-Detect	5
Variance Detects	51701	Percent Non-Detects	64.41%
Mean Detects	87.23	SD Detects	227.4
Median Detects	7.05	CV Detects	2.607
Skewness Detects	5.016	Kurtosis Detects	28.33
Mean of Logged Detects	1.245	SD of Logged Detects	3.775
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.412	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.351	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.137	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	31.05	Standard Error of Mean	13.08
SD	140.4	95% KM (BCA) UCL	54.27

95% KM (t) UCL	52.74	95% KM (Percentile Bootstrap) UCL	54
95% KM (z) UCL	52.57	95% KM Bootstrap t UCL	87.59
90% KM Chebyshev UCL	70.29	95% KM Chebyshev UCL	88.07
97.5% KM Chebyshev UCL	112.7	99% KM Chebyshev UCL	161.2
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.491	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.898	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.087	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.151	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.224	k star (bias corrected MLE)	0.224
Theta hat (MLE)	389.1	Theta star (bias corrected MLE)	389.3
nu hat (MLE)	18.83	nu star (bias corrected)	18.82
MLE Mean (bias corrected)	87.23	MLE Sd (bias corrected)	184.3
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0489	nu hat (KM)	11.55
Approximate Chi Square Value (11.55, α)	4.93	Adjusted Chi Square Value (11.55, β)	4.877
95% Gamma Approximate KM-UCL (use when n>=50)	72.73	95% Gamma Adjusted KM-UCL (use when n<50)	73.53
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0015	Mean	31.05
Maximum	1400	Median	0.01
SD	141	CV	4.54
k hat (MLE)	0.131	k star (bias corrected MLE)	0.134
Theta hat (MLE)	236.3	Theta star (bias corrected MLE)	232.2
nu hat (MLE)	31.02	nu star (bias corrected)	31.56
MLE Mean (bias corrected)	31.05	MLE Sd (bias corrected)	84.92
		Adjusted Level of Significance (β)	0.048
Approximate Chi Square Value (31.56, α)	19.73	Adjusted Chi Square Value (31.56, β)	19.61
95% Gamma Approximate UCL (use when n>=50)	49.69	95% Gamma Adjusted UCL (use when n<50)	49.98
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.137	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	31.05	Mean in Log Scale	-4.904
SD in Original Scale	141	SD in Log Scale	5.922
95% t UCL (assumes normality of ROS data)	52.57	95% Percentile Bootstrap UCL	54.3
95% BCA Bootstrap UCL	69.99	95% Bootstrap t UCL	88.37
95% H-UCL (Log ROS)	35532716		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	31.13	Mean in Log Scale	-2.682
SD in Original Scale	141	SD in Log Scale	4.063
95% t UCL (Assumes normality)	52.64	95% H-Stat UCL	2575
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	52.74	95% GROS Approximate Gamma UCL	49.69
95% Approximate Gamma KM-UCL	72.73		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|tphd|)			
General Statistics			
Total Number of Observations	59	Number of Distinct Observations	39
Number of Detects	38	Number of Non-Detects	21
Number of Distinct Detects	35	Number of Distinct Non-Detects	4
Minimum Detect	2.55	Minimum Non-Detect	2.4
Maximum Detect	430	Maximum Non-Detect	10
Variance Detects	6292	Percent Non-Detects	35.59%
Mean Detects	59.14	SD Detects	79.32
Median Detects	39	CV Detects	1.341
Skewness Detects	3.106	Kurtosis Detects	12.56
Mean of Logged Detects	3.337	SD of Logged Detects	1.331
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.677	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.938	Detected Data Not Normal at 5% Significance Level	

Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.144	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	39.17	Standard Error of Mean	9.015
SD	68.32	95% KM (BCA) UCL	54.87
95% KM (t) UCL	54.24	95% KM (Percentile Bootstrap) UCL	55.18
95% KM (z) UCL	53.99	95% KM Bootstrap t UCL	61.4
90% KM Chebyshev UCL	66.21	95% KM Chebyshev UCL	78.46
97.5% KM Chebyshev UCL	95.46	99% KM Chebyshev UCL	128.9
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.461	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.786	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.11	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.149	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.799	k star (bias corrected MLE)	0.753
Theta hat (MLE)	74.05	Theta star (bias corrected MLE)	78.52
nu hat (MLE)	60.7	nu star (bias corrected)	57.24
MLE Mean (bias corrected)	59.14	MLE Sd (bias corrected)	68.14
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.329	nu hat (KM)	38.78
Approximate Chi Square Value (38.78, α)	25.52	Adjusted Chi Square Value (38.78, β)	25.25
95% Gamma Approximate KM-UCL (use when n>=50)	59.52	95% Gamma Adjusted KM-UCL (use when n<50)	60.16
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	38.09
Maximum	430	Median	7.8
SD	69.49	CV	1.824
k hat (MLE)	0.23	k star (bias corrected MLE)	0.23
Theta hat (MLE)	165.6	Theta star (bias corrected MLE)	165.9
nu hat (MLE)	27.14	nu star (bias corrected)	27.09
MLE Mean (bias corrected)	38.09	MLE Sd (bias corrected)	79.5
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (27.09, α)	16.22	Adjusted Chi Square Value (27.09, β)	16.01
95% Gamma Approximate UCL (use when n>=50)	63.61	95% Gamma Adjusted UCL (use when n<50)	64.45

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.938	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.144	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	39.08	Mean in Log Scale	2.388
SD in Original Scale	68.96	SD in Log Scale	1.759
95% t UCL (assumes normality of ROS data)	54.09	95% Percentile Bootstrap UCL	54.56
95% BCA Bootstrap UCL	59.64	95% Bootstrap t UCL	63.47
95% H-UCL (Log ROS)	115.3		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	2.531	95% H-UCL (KM -Log)	75.18
KM SD (logged)	1.519	95% Critical H Value (KM-Log)	3.182
KM Standard Error of Mean (logged)	0.204		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	38.98	Mean in Log Scale	2.463
SD in Original Scale	69.01	SD in Log Scale	1.6
95% t UCL (Assumes normality)	53.99	95% H-Stat UCL	84.33
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	54.87	95% GROS Approximate Gamma UCL	63.61
95% Approximate Gamma KM-UCL	59.52		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|tphg|)			
General Statistics			
Total Number of Observations	118	Number of Distinct Observations	60
Number of Detects	65	Number of Non-Detects	53
Number of Distinct Detects	55	Number of Distinct Non-Detects	6

Minimum Detect	1	Minimum Non-Detect	0.099
Maximum Detect	17000	Maximum Non-Detect	50
Variance Detects	5755959	Percent Non-Detects	44.92%
Mean Detects	1047	SD Detects	2399
Median Detects	230	CV Detects	2.291
Skewness Detects	5.089	Kurtosis Detects	31.31
Mean of Logged Detects	5.025	SD of Logged Detects	2.579
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.467	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.331	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.11	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	577	Standard Error of Mean	170.9
SD	1842	95% KM (BCA) UCL	914.1
95% KM (t) UCL	860.3	95% KM (Percentile Bootstrap) UCL	888
95% KM (z) UCL	858.1	95% KM Bootstrap t UCL	1151
90% KM Chebyshev UCL	1090	95% KM Chebyshev UCL	1322
97.5% KM Chebyshev UCL	1644	99% KM Chebyshev UCL	2277
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.829	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.853	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.108	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.119	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.349	k star (bias corrected MLE)	0.343
Theta hat (MLE)	3002	Theta star (bias corrected MLE)	3053
nu hat (MLE)	45.35	nu star (bias corrected)	44.59
MLE Mean (bias corrected)	1047	MLE Sd (bias corrected)	1788
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0981	nu hat (KM)	23.15
Approximate Chi Square Value (23.15, α)	13.21	Adjusted Chi Square Value (23.15, β)	13.11
95% Gamma Approximate KM-UCL (use when n>=50)	1012	95% Gamma Adjusted KM-UCL (use when n<50)	1019
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			

For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	576.9
Maximum	17000	Median	1.3
SD	1850	CV	3.207
k hat (MLE)	0.138	k star (bias corrected MLE)	0.14
Theta hat (MLE)	4194	Theta star (bias corrected MLE)	4129
nu hat (MLE)	32.46	nu star (bias corrected)	32.97
MLE Mean (bias corrected)	576.9	MLE Sd (bias corrected)	1543
		Adjusted Level of Significance (β)	0.048
Approximate Chi Square Value (32.97, α)	20.84	Adjusted Chi Square Value (32.97, β)	20.72
95% Gamma Approximate UCL (use when n>=50)	912.5	95% Gamma Adjusted UCL (use when n<50)	917.8
Lognormal GOF Test on Detected Observations Only			
Lilliefors Test Statistic	0.153	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.11	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	577.4	Mean in Log Scale	2.333
SD in Original Scale	1850	SD in Log Scale	3.771
95% t UCL (assumes normality of ROS data)	859.7	95% Percentile Bootstrap UCL	907.2
95% BCA Bootstrap UCL	1016	95% Bootstrap t UCL	1089
95% H-UCL (Log ROS)	91334		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	578	Mean in Log Scale	2.497
SD in Original Scale	1850	SD in Log Scale	3.523
95% t UCL (Assumes normality)	860.3	95% H-Stat UCL	34296
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	914.1	95% GROS Approximate Gamma UCL	912.5
95% Approximate Gamma KM-UCL	1012		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-10|tphmo|)			

General Statistics			
Total Number of Observations	59	Number of Distinct Observations	34
Number of Detects	31	Number of Non-Detects	28
Number of Distinct Detects	30	Number of Distinct Non-Detects	5
Minimum Detect	8.3	Minimum Non-Detect	4.8
Maximum Detect	1200	Maximum Non-Detect	25
Variance Detects	67962	Percent Non-Detects	47.46%
Mean Detects	185	SD Detects	260.7
Median Detects	99	CV Detects	1.409
Skewness Detects	2.878	Kurtosis Detects	8.74
Mean of Logged Detects	4.555	SD of Logged Detects	1.195
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.625	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	100	Standard Error of Mean	27.3
SD	206.3	95% KM (BCA) UCL	145.1
95% KM (t) UCL	145.7	95% KM (Percentile Bootstrap) UCL	146.4
95% KM (z) UCL	144.9	95% KM Bootstrap t UCL	184.3
90% KM Chebyshev UCL	181.9	95% KM Chebyshev UCL	219
97.5% KM Chebyshev UCL	270.5	99% KM Chebyshev UCL	371.7
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.694	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.781	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.156	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.163	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.881	k star (bias corrected MLE)	0.817
Theta hat (MLE)	210	Theta star (bias corrected MLE)	226.4
nu hat (MLE)	54.6	nu star (bias corrected)	50.65
MLE Mean (bias corrected)	185	MLE Sd (bias corrected)	204.7
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.235	nu hat (KM)	27.75
Approximate Chi Square Value (27.75, α)	16.73	Adjusted Chi Square Value (27.75, β)	16.52
95% Gamma Approximate KM-UCL (use when n>=50)	165.9	95% Gamma Adjusted KM-UCL (use when n<50)	168.1

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	97.2
Maximum	1200	Median	10
SD	209.4	CV	2.154
k hat (MLE)	0.172	k star (bias corrected MLE)	0.175
Theta hat (MLE)	564	Theta star (bias corrected MLE)	555.8
nu hat (MLE)	20.34	nu star (bias corrected)	20.63
MLE Mean (bias corrected)	97.2	MLE Sd (bias corrected)	232.4
		Adjusted Level of Significance (β)	0.0459
Approximate Chi Square Value (20.63, α)	11.32	Adjusted Chi Square Value (20.63, β)	11.15
95% Gamma Approximate UCL (use when n>=50)	177.2	95% Gamma Adjusted UCL (use when n<50)	179.9
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.98	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0866	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	100.4	Mean in Log Scale	3.134
SD in Original Scale	207.9	SD in Log Scale	1.847
95% t UCL (assumes normality of ROS data)	145.7	95% Percentile Bootstrap UCL	151.1
95% BCA Bootstrap UCL	164.5	95% Bootstrap t UCL	186.2
95% H-UCL (Log ROS)	305.3		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.195	95% H-UCL (KM -Log)	214.3
KM SD (logged)	1.685	95% Critical H Value (KM-Log)	3.407
KM Standard Error of Mean (logged)	0.226		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	100.5	Mean in Log Scale	3.189
SD in Original Scale	207.8	SD in Log Scale	1.767
95% t UCL (Assumes normality)	145.8	95% H-Stat UCL	261.5
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			

Suggested UCL to Use			
95% KM (BCA) UCL	145.1	95% GROS Approximate Gamma UCL	177.2
95% Approximate Gamma KM-UCL	165.9		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|0-3|anthracene|)

General Statistics			
Total Number of Observations	40	Number of Distinct Observations	19
Number of Detects	4	Number of Non-Detects	36
Number of Distinct Detects	4	Number of Distinct Non-Detects	16
Minimum Detect	0.026	Minimum Non-Detect	0.02
Maximum Detect	0.055	Maximum Non-Detect	6.6
Variance Detects	1.8967E-4	Percent Non-Detects	90%
Mean Detects	0.0345	SD Detects	0.0138
Median Detects	0.0285	CV Detects	0.399
Skewness Detects	1.911	Kurtosis Detects	3.68
Mean of Logged Detects	-3.417	SD of Logged Detects	0.35
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.734	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.378	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.026	Standard Error of Mean	0.00272
SD	0.00815	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0306	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0305	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0342	95% KM Chebyshev UCL	0.0379
97.5% KM Chebyshev UCL	0.043	99% KM Chebyshev UCL	0.053
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.652	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.378	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	10.1	k star (bias corrected MLE)	2.691
Theta hat (MLE)	0.00342	Theta star (bias corrected MLE)	0.0128
nu hat (MLE)	80.76	nu star (bias corrected)	21.52
MLE Mean (bias corrected)	0.0345	MLE Sd (bias corrected)	0.021
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	10.21	nu hat (KM)	816.7
Approximate Chi Square Value (816.73, α)	751.4	Adjusted Chi Square Value (816.73, β)	749.1
95% Gamma Approximate KM-UCL (use when n>=50)	0.0283	95% Gamma Adjusted KM-UCL (use when n<50)	0.0284
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0219
Maximum	0.055	Median	0.0211
SD	0.00857	CV	0.392
k hat (MLE)	7.359	k star (bias corrected MLE)	6.824
Theta hat (MLE)	0.00297	Theta star (bias corrected MLE)	0.0032
nu hat (MLE)	588.7	nu star (bias corrected)	545.9
MLE Mean (bias corrected)	0.0219	MLE Sd (bias corrected)	0.00837
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (545.91, α)	492.7	Adjusted Chi Square Value (545.91, β)	490.8
95% Gamma Approximate UCL (use when n>=50)	0.0242	95% Gamma Adjusted UCL (use when n<50)	N/A
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.773	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.351	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0238	Mean in Log Scale	-3.773
SD in Original Scale	0.007	SD in Log Scale	0.257
95% t UCL (assumes normality of ROS data)	0.0257	95% Percentile Bootstrap UCL	0.0257
95% BCA Bootstrap UCL	0.0263	95% Bootstrap t UCL	0.0262
95% H-UCL (Log ROS)	0.0255		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.685	95% H-UCL (KM -Log)	0.0278
KM SD (logged)	0.25	95% Critical H Value (KM-Log)	1.764

KM Standard Error of Mean (logged)	0.0938		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.212	Mean in Log Scale	-2.737
SD in Original Scale	0.571	SD in Log Scale	1.29
95% t UCL (Assumes normality)	0.364	95% H-Stat UCL	0.263
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0306	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|benzo(a) anthracene|)			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	24
Number of Detects	11	Number of Non-Detects	29
Number of Distinct Detects	9	Number of Distinct Non-Detects	15
Minimum Detect	0.047	Minimum Non-Detect	0.02
Maximum Detect	0.22	Maximum Non-Detect	6.6
Variance Detects	0.00302	Percent Non-Detects	72.5%
Mean Detects	0.112	SD Detects	0.055
Median Detects	0.11	CV Detects	0.493
Skewness Detects	1.021	Kurtosis Detects	0.525
Mean of Logged Detects	-2.3	SD of Logged Detects	0.486
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0581	Standard Error of Mean	0.0108
SD	0.0541	95% KM (BCA) UCL	0.0816

95% KM (t) UCL	0.0763	95% KM (Percentile Bootstrap) UCL	0.0784
95% KM (z) UCL	0.0758	95% KM Bootstrap t UCL	0.078
90% KM Chebyshev UCL	0.0905	95% KM Chebyshev UCL	0.105
97.5% KM Chebyshev UCL	0.126	99% KM Chebyshev UCL	0.166
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.345	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.195	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.855	k star (bias corrected MLE)	3.592
Theta hat (MLE)	0.023	Theta star (bias corrected MLE)	0.031
nu hat (MLE)	106.8	nu star (bias corrected)	79.02
MLE Mean (bias corrected)	0.112	MLE Sd (bias corrected)	0.0588
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.152	nu hat (KM)	92.18
Approximate Chi Square Value (92.18, α)	71.04	Adjusted Chi Square Value (92.18, β)	70.34
95% Gamma Approximate KM-UCL (use when n>=50)	0.0754	95% Gamma Adjusted KM-UCL (use when n<50)	0.0761
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0488
Maximum	0.22	Median	0.0341
SD	0.0513	CV	1.052
k hat (MLE)	1.135	k star (bias corrected MLE)	1.067
Theta hat (MLE)	0.043	Theta star (bias corrected MLE)	0.0457
nu hat (MLE)	90.8	nu star (bias corrected)	85.32
MLE Mean (bias corrected)	0.0488	MLE Sd (bias corrected)	0.0472
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (85.32, α)	65.03	Adjusted Chi Square Value (85.32, β)	64.37
95% Gamma Approximate UCL (use when n>=50)	0.064	95% Gamma Adjusted UCL (use when n<50)	0.0646
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0589	Mean in Log Scale	-3.04
SD in Original Scale	0.045	SD in Log Scale	0.622
95% t UCL (assumes normality of ROS data)	0.0709	95% Percentile Bootstrap UCL	0.0715
95% BCA Bootstrap UCL	0.072	95% Bootstrap t UCL	0.0752
95% H-UCL (Log ROS)	0.071		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.22	95% H-UCL (KM -Log)	0.0762
KM SD (logged)	0.834	95% Critical H Value (KM-Log)	2.226
KM Standard Error of Mean (logged)	0.173		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.227	Mean in Log Scale	-2.589
SD in Original Scale	0.568	SD in Log Scale	1.333
95% t UCL (Assumes normality)	0.378	95% H-Stat UCL	0.333
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0763	95% KM (Percentile Bootstrap) UCL	0.0784
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|benzo(a) pyrene|)			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	25
Number of Detects	13	Number of Non-Detects	27
Number of Distinct Detects	11	Number of Distinct Non-Detects	15
Minimum Detect	0.043	Minimum Non-Detect	0.02
Maximum Detect	1.7	Maximum Non-Detect	6.6
Variance Detects	0.192	Percent Non-Detects	67.5%
Mean Detects	0.261	SD Detects	0.438
Median Detects	0.14	CV Detects	1.681
Skewness Detects	3.45	Kurtosis Detects	12.19
Mean of Logged Detects	-1.903	SD of Logged Detects	0.926

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.457	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.424	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.114	Standard Error of Mean	0.0461
SD	0.27	95% KM (BCA) UCL	0.211
95% KM (t) UCL	0.192	95% KM (Percentile Bootstrap) UCL	0.199
95% KM (z) UCL	0.19	95% KM Bootstrap t UCL	0.341
90% KM Chebyshev UCL	0.252	95% KM Chebyshev UCL	0.315
97.5% KM Chebyshev UCL	0.402	99% KM Chebyshev UCL	0.573
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.335	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.757	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.294	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.243	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.031	k star (bias corrected MLE)	0.845
Theta hat (MLE)	0.253	Theta star (bias corrected MLE)	0.308
nu hat (MLE)	26.82	nu star (bias corrected)	21.96
MLE Mean (bias corrected)	0.261	MLE Sd (bias corrected)	0.283
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.178	nu hat (KM)	14.27
Approximate Chi Square Value (14.27, α)	6.76	Adjusted Chi Square Value (14.27, β)	6.566
95% Gamma Approximate KM-UCL (use when n>=50)	0.241	95% Gamma Adjusted KM-UCL (use when n<50)	0.248
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0927
Maximum	1.7	Median	0.01
SD	0.27	CV	2.914
k hat (MLE)	0.489	k star (bias corrected MLE)	0.469
Theta hat (MLE)	0.19	Theta star (bias corrected MLE)	0.198
nu hat (MLE)	39.13	nu star (bias corrected)	37.53
MLE Mean (bias corrected)	0.0927	MLE Sd (bias corrected)	0.135

		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (37.53, α)	24.5	Adjusted Chi Square Value (37.53, β)	24.11
95% Gamma Approximate UCL (use when n>=50)	0.142	95% Gamma Adjusted UCL (use when n<50)	0.144
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.103	Mean in Log Scale	-3.187
SD in Original Scale	0.267	SD in Log Scale	1.169
95% t UCL (assumes normality of ROS data)	0.174	95% Percentile Bootstrap UCL	0.189
95% BCA Bootstrap UCL	0.232	95% Bootstrap t UCL	0.361
95% H-UCL (Log ROS)	0.133		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.019	95% H-UCL (KM -Log)	0.14
KM SD (logged)	1.101	95% Critical H Value (KM-Log)	2.527
KM Standard Error of Mean (logged)	0.208		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.27	Mean in Log Scale	-2.487
SD in Original Scale	0.612	SD in Log Scale	1.43
95% t UCL (Assumes normality)	0.434	95% H-Stat UCL	0.455
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.192	95% KM (% Bootstrap) UCL	0.199
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|benzo(b) fluoranthene|)			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	27

Number of Detects	14	Number of Non-Detects	26
Number of Distinct Detects	13	Number of Distinct Non-Detects	15
Minimum Detect	0.027	Minimum Non-Detect	0.02
Maximum Detect	2	Maximum Non-Detect	6.6
Variance Detects	0.258	Percent Non-Detects	65%
Mean Detects	0.25	SD Detects	0.508
Median Detects	0.115	CV Detects	2.032
Skewness Detects	3.647	Kurtosis Detects	13.49
Mean of Logged Detects	-2.117	SD of Logged Detects	1.023
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.408	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.428	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.116	Standard Error of Mean	0.0533
SD	0.315	95% KM (BCA) UCL	0.228
95% KM (t) UCL	0.205	95% KM (Percentile Bootstrap) UCL	0.216
95% KM (z) UCL	0.203	95% KM Bootstrap t UCL	0.471
90% KM Chebyshev UCL	0.276	95% KM Chebyshev UCL	0.348
97.5% KM Chebyshev UCL	0.449	99% KM Chebyshev UCL	0.646
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.632	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.768	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.316	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.237	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.812	k star (bias corrected MLE)	0.686
Theta hat (MLE)	0.308	Theta star (bias corrected MLE)	0.364
nu hat (MLE)	22.74	nu star (bias corrected)	19.2
MLE Mean (bias corrected)	0.25	MLE Sd (bias corrected)	0.302
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.134	nu hat (KM)	10.74
Approximate Chi Square Value (10.74, α)	4.408	Adjusted Chi Square Value (10.74, β)	4.256
95% Gamma Approximate KM-UCL (use when n>=50)	0.281	95% Gamma Adjusted KM-UCL (use when n<50)	0.291
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			

GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0939
Maximum	2	Median	0.01
SD	0.315	CV	3.355
k hat (MLE)	0.469	k star (bias corrected MLE)	0.45
Theta hat (MLE)	0.2	Theta star (bias corrected MLE)	0.209
nu hat (MLE)	37.5	nu star (bias corrected)	36.02
MLE Mean (bias corrected)	0.0939	MLE Sd (bias corrected)	0.14
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (36.02, α)	23.28	Adjusted Chi Square Value (36.02, β)	22.9
95% Gamma Approximate UCL (use when n>=50)	0.145	95% Gamma Adjusted UCL (use when n<50)	0.148
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.102	Mean in Log Scale	-3.312
SD in Original Scale	0.313	SD in Log Scale	1.193
95% t UCL (assumes normality of ROS data)	0.186	95% Percentile Bootstrap UCL	0.201
95% BCA Bootstrap UCL	0.256	95% Bootstrap t UCL	0.5
95% H-UCL (Log ROS)	0.123		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.005	95% H-UCL (KM -Log)	0.123
KM SD (logged)	1.013	95% Critical H Value (KM-Log)	2.423
KM Standard Error of Mean (logged)	0.195		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.268	Mean in Log Scale	-2.572
SD in Original Scale	0.634	SD in Log Scale	1.426
95% t UCL (Assumes normality)	0.436	95% H-Stat UCL	0.414
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.228		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
Recommendations are based upon data size, data distribution, and skewness.						
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).						
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
Conc (|soil|0-3|benzo(g,h,i) perylene|)						
General Statistics						
Total Number of Observations	40			Number of Distinct Observations	24	
Number of Detects	11			Number of Non-Detects	29	
Number of Distinct Detects	11			Number of Distinct Non-Detects	14	
Minimum Detect	0.024			Minimum Non-Detect	0.02	
Maximum Detect	2.4			Maximum Non-Detect	6.6	
Variance Detects	0.469			Percent Non-Detects	72.5%	
Mean Detects	0.346			SD Detects	0.685	
Median Detects	0.18			CV Detects	1.98	
Skewness Detects	3.251			Kurtosis Detects	10.69	
Mean of Logged Detects	-1.909			SD of Logged Detects	1.206	
Normal GOF Test on Detects Only						
Shapiro Wilk Test Statistic	0.441			**Shapiro Wilk GOF Test**		
5% Shapiro Wilk Critical Value	0.85			Detected Data Not Normal at 5% Significance Level		
Lilliefors Test Statistic	0.482			**Lilliefors GOF Test**		
5% Lilliefors Critical Value	0.267			Detected Data Not Normal at 5% Significance Level		
Detected Data Not Normal at 5% Significance Level						
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs						
Mean	0.126			Standard Error of Mean	0.0649	
SD	0.38			95% KM (BCA) UCL	0.284	
95% KM (t) UCL	0.235			95% KM (Percentile Bootstrap) UCL	0.246	
95% KM (z) UCL	0.232			95% KM Bootstrap t UCL	0.56	
90% KM Chebyshev UCL	0.32			95% KM Chebyshev UCL	0.409	
97.5% KM Chebyshev UCL	0.531			99% KM Chebyshev UCL	0.772	
Gamma GOF Tests on Detected Observations Only						
A-D Test Statistic	1.356			**Anderson-Darling GOF Test**		
5% A-D Critical Value	0.765			Detected Data Not Gamma Distributed at 5% Significance Level		
K-S Test Statistic	0.387			**Kolmogrov-Smirnoff GOF**		
5% K-S Critical Value	0.266			Detected Data Not Gamma Distributed at 5% Significance Level		
Detected Data Not Gamma Distributed at 5% Significance Level						
Gamma Statistics on Detected Data Only						
k hat (MLE)	0.712			k star (bias corrected MLE)	0.578	
Theta hat (MLE)	0.486			Theta star (bias corrected MLE)	0.598	

nu hat (MLE)	15.66	nu star (bias corrected)	12.72
MLE Mean (bias corrected)	0.346	MLE Sd (bias corrected)	0.455
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.109	nu hat (KM)	8.745
Approximate Chi Square Value (8.75, α)	3.174	Adjusted Chi Square Value (8.75, β)	3.049
95% Gamma Approximate KM-UCL (use when n>=50)	0.346	95% Gamma Adjusted KM-UCL (use when n<50)	0.36
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.102
Maximum	2.4	Median	0.01
SD	0.379	CV	3.698
k hat (MLE)	0.413	k star (bias corrected MLE)	0.399
Theta hat (MLE)	0.248	Theta star (bias corrected MLE)	0.257
nu hat (MLE)	33.05	nu star (bias corrected)	31.9
MLE Mean (bias corrected)	0.102	MLE Sd (bias corrected)	0.162
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (31.90, α)	19.99	Adjusted Chi Square Value (31.90, β)	19.64
95% Gamma Approximate UCL (use when n>=50)	0.163	95% Gamma Adjusted UCL (use when n<50)	0.166
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.281	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.11	Mean in Log Scale	-3.534
SD in Original Scale	0.377	SD in Log Scale	1.369
95% t UCL (assumes normality of ROS data)	0.211	95% Percentile Bootstrap UCL	0.227
95% BCA Bootstrap UCL	0.288	95% Bootstrap t UCL	0.601
95% H-UCL (Log ROS)	0.14		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.092	95% H-UCL (KM -Log)	0.126
KM SD (logged)	1.083	95% Critical H Value (KM-Log)	2.506
KM Standard Error of Mean (logged)	0.211		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	

Mean in Original Scale	0.285	Mean in Log Scale	-2.485
SD in Original Scale	0.663	SD in Log Scale	1.418
95% t UCL (Assumes normality)	0.462	95% H-Stat UCL	0.444
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.284		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|benzo(k) fluoranthene|)			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	24
Number of Detects	11	Number of Non-Detects	29
Number of Distinct Detects	10	Number of Distinct Non-Detects	15
Minimum Detect	0.035	Minimum Non-Detect	0.02
Maximum Detect	0.19	Maximum Non-Detect	6.6
Variance Detects	0.00235	Percent Non-Detects	72.5%
Mean Detects	0.0955	SD Detects	0.0485
Median Detects	0.094	CV Detects	0.508
Skewness Detects	0.865	Kurtosis Detects	0.314
Mean of Logged Detects	-2.469	SD of Logged Detects	0.525
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0522	Standard Error of Mean	0.00925
SD	0.0459	95% KM (BCA) UCL	0.0735
95% KM (t) UCL	0.0678	95% KM (Percentile Bootstrap) UCL	0.0705
95% KM (z) UCL	0.0675	95% KM Bootstrap t UCL	0.0695
90% KM Chebyshev UCL	0.08	95% KM Chebyshev UCL	0.0926
97.5% KM Chebyshev UCL	0.11	99% KM Chebyshev UCL	0.144

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.254	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.141	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.325	k star (bias corrected MLE)	3.206
Theta hat (MLE)	0.0221	Theta star (bias corrected MLE)	0.0298
nu hat (MLE)	95.15	nu star (bias corrected)	70.54
MLE Mean (bias corrected)	0.0955	MLE Sd (bias corrected)	0.0533
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.296	nu hat (KM)	103.7
Approximate Chi Square Value (103.71, α)	81.21	Adjusted Chi Square Value (103.71, β)	80.47
95% Gamma Approximate KM-UCL (use when n>=50)	0.0667	95% Gamma Adjusted KM-UCL (use when n<50)	0.0673
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0432
Maximum	0.19	Median	0.0317
SD	0.0437	CV	1.012
k hat (MLE)	1.254	k star (bias corrected MLE)	1.177
Theta hat (MLE)	0.0344	Theta star (bias corrected MLE)	0.0367
nu hat (MLE)	100.4	nu star (bias corrected)	94.17
MLE Mean (bias corrected)	0.0432	MLE Sd (bias corrected)	0.0398
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (94.17, α)	72.79	Adjusted Chi Square Value (94.17, β)	72.08
95% Gamma Approximate UCL (use when n>=50)	0.0559	95% Gamma Adjusted UCL (use when n<50)	0.0564
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.128	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0501	Mean in Log Scale	-3.212
SD in Original Scale	0.0392	SD in Log Scale	0.637
95% t UCL (assumes normality of ROS data)	0.0605	95% Percentile Bootstrap UCL	0.0607

95% BCA Bootstrap UCL	0.063	95% Bootstrap t UCL	0.0639
95% H-UCL (Log ROS)	0.0607		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.271	95% H-UCL (KM -Log)	0.0661
KM SD (logged)	0.763	95% Critical H Value (KM-Log)	2.153
KM Standard Error of Mean (logged)	0.16		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.223	Mean in Log Scale	-2.635
SD in Original Scale	0.569	SD in Log Scale	1.328
95% t UCL (Assumes normality)	0.374	95% H-Stat UCL	0.315
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0678	95% KM (Percentile Bootstrap) UCL	0.0705
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|bis(2-ethylhexyl)phthalate|)			
General Statistics			
Total Number of Observations	20	Number of Distinct Observations	14
Number of Detects	7	Number of Non-Detects	13
Number of Distinct Detects	7	Number of Distinct Non-Detects	7
Minimum Detect	0.0683	Minimum Non-Detect	0.067
Maximum Detect	5.6	Maximum Non-Detect	6.6
Variance Detects	4.638	Percent Non-Detects	65%
Mean Detects	1.661	SD Detects	2.154
Median Detects	0.467	CV Detects	1.297
Skewness Detects	1.352	Kurtosis Detects	0.571
Mean of Logged Detects	-0.513	SD of Logged Detects	1.733
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.784	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level	

Appendix C - ProUCL Output

Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.674	Standard Error of Mean	0.355
SD	1.428	95% KM (BCA) UCL	1.345
95% KM (t) UCL	1.287	95% KM (Percentile Bootstrap) UCL	1.314
95% KM (z) UCL	1.257	95% KM Bootstrap t UCL	2.629
90% KM Chebyshev UCL	1.738	95% KM Chebyshev UCL	2.219
97.5% KM Chebyshev UCL	2.888	99% KM Chebyshev UCL	4.201
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.331	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.212	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.325	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.605	k star (bias corrected MLE)	0.441
Theta hat (MLE)	2.748	Theta star (bias corrected MLE)	3.769
nu hat (MLE)	8.464	nu star (bias corrected)	6.17
MLE Mean (bias corrected)	1.661	MLE Sd (bias corrected)	2.502
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.223	nu hat (KM)	8.918
Approximate Chi Square Value (8.92, α)	3.277	Adjusted Chi Square Value (8.92, β)	3.012
95% Gamma Approximate KM-UCL (use when n>=50)	1.835	95% Gamma Adjusted KM-UCL (use when n<50)	1.996
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.614
Maximum	5.6	Median	0.01
SD	1.449	CV	2.362
k hat (MLE)	0.28	k star (bias corrected MLE)	0.272
Theta hat (MLE)	2.188	Theta star (bias corrected MLE)	2.258
nu hat (MLE)	11.22	nu star (bias corrected)	10.87
MLE Mean (bias corrected)	0.614	MLE Sd (bias corrected)	1.177
		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (10.87, α)	4.49	Adjusted Chi Square Value (10.87, β)	4.17
95% Gamma Approximate UCL (use when n>=50)	1.485	95% Gamma Adjusted UCL (use when n<50)	1.599
Lognormal GOF Test on Detected Observations Only			

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.626	Mean in Log Scale	-2.306
SD in Original Scale	1.441	SD in Log Scale	1.907
95% t UCL (assumes normality of ROS data)	1.183	95% Percentile Bootstrap UCL	1.172
95% BCA Bootstrap UCL	1.413	95% Bootstrap t UCL	2.893
95% H-UCL (Log ROS)	3.758		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-1.778	95% H-UCL (KM -Log)	1.374
KM SD (logged)	1.426	95% Critical H Value (KM-Log)	3.301
KM Standard Error of Mean (logged)	0.37		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.862	Mean in Log Scale	-1.269
SD in Original Scale	1.518	SD in Log Scale	1.462
95% t UCL (Assumes normality)	1.449	95% H-Stat UCL	2.525
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	1.287	95% KM (Percentile Bootstrap) UCL	1.314
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|chrysene|)			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	23
Number of Detects	12	Number of Non-Detects	28
Number of Distinct Detects	9	Number of Distinct Non-Detects	15
Minimum Detect	0.052	Minimum Non-Detect	0.02
Maximum Detect	1	Maximum Non-Detect	6.6
Variance Detects	0.0662	Percent Non-Detects	70%

Mean Detects	0.21	SD Detects	0.257
Median Detects	0.15	CV Detects	1.223
Skewness Detects	3.07	Kurtosis Detects	10.01
Mean of Logged Detects	-1.925	SD of Logged Detects	0.795
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.565	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.355	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0925	Standard Error of Mean	0.0291
SD	0.166	95% KM (BCA) UCL	0.158
95% KM (t) UCL	0.142	95% KM (Percentile Bootstrap) UCL	0.147
95% KM (z) UCL	0.14	95% KM Bootstrap t UCL	0.186
90% KM Chebyshev UCL	0.18	95% KM Chebyshev UCL	0.219
97.5% KM Chebyshev UCL	0.274	99% KM Chebyshev UCL	0.382
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.857	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.24	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.25	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.51	k star (bias corrected MLE)	1.188
Theta hat (MLE)	0.139	Theta star (bias corrected MLE)	0.177
nu hat (MLE)	36.24	nu star (bias corrected)	28.51
MLE Mean (bias corrected)	0.21	MLE Sd (bias corrected)	0.193
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.311	nu hat (KM)	24.87
Approximate Chi Square Value (24.87, α)	14.51	Adjusted Chi Square Value (24.87, β)	14.21
95% Gamma Approximate KM-UCL (use when n>=50)	0.159	95% Gamma Adjusted KM-UCL (use when n<50)	0.162
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0717
Maximum	1	Median	0.01

SD	0.165	CV	2.301
k hat (MLE)	0.559	k star (bias corrected MLE)	0.534
Theta hat (MLE)	0.128	Theta star (bias corrected MLE)	0.134
nu hat (MLE)	44.75	nu star (bias corrected)	42.73
MLE Mean (bias corrected)	0.0717	MLE Sd (bias corrected)	0.0981
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (42.73, α)	28.74	Adjusted Chi Square Value (42.73, β)	28.31
95% Gamma Approximate UCL (use when n>=50)	0.107	95% Gamma Adjusted UCL (use when n<50)	0.108
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0848	Mean in Log Scale	-3.12
SD in Original Scale	0.161	SD in Log Scale	1.019
95% t UCL (assumes normality of ROS data)	0.128	95% Percentile Bootstrap UCL	0.131
95% BCA Bootstrap UCL	0.159	95% Bootstrap t UCL	0.196
95% H-UCL (Log ROS)	0.11		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.078	95% H-UCL (KM -Log)	0.121
KM SD (logged)	1.049	95% Critical H Value (KM-Log)	2.465
KM Standard Error of Mean (logged)	0.203		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.251	Mean in Log Scale	-2.506
SD in Original Scale	0.58	SD in Log Scale	1.394
95% t UCL (Assumes normality)	0.406	95% H-Stat UCL	0.412
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.142	95% GROS Adjusted Gamma UCL	0.108
95% Adjusted Gamma KM-UCL	0.162		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|0-3|dibenz(a,h) anthracene|)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	17
Number of Detects	2	Number of Non-Detects	38
Number of Distinct Detects	2	Number of Distinct Non-Detects	15
Minimum Detect	0.022	Minimum Non-Detect	0.02
Maximum Detect	0.035	Maximum Non-Detect	8.4
Variance Detects	8.4500E-5	Percent Non-Detects	95%
Mean Detects	0.0285	SD Detects	0.00919
Median Detects	0.0285	CV Detects	0.323
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.585	SD of Logged Detects	0.328

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0222	Standard Error of Mean	0.00245
SD	0.00489	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0264	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0263	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0296	95% KM Chebyshev UCL	0.0329
97.5% KM Chebyshev UCL	0.0376	99% KM Chebyshev UCL	0.0466

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	18.89	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00151	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	75.54	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	20.69	nu hat (KM)	1655
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (N/A, α)	1562	Adjusted Chi Square Value (N/A, β)	1558
95% Gamma Approximate KM-UCL (use when n>=50)	0.0236	95% Gamma Adjusted KM-UCL (use when n<50)	0.0236

Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0144	Mean in Log Scale	-4.315
SD in Original Scale	0.00582	SD in Log Scale	0.378
95% t UCL (assumes normality of ROS data)	0.0159	95% Percentile Bootstrap UCL	0.0159
95% BCA Bootstrap UCL	0.0162	95% Bootstrap t UCL	0.0162
95% H-UCL (Log ROS)	0.016		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.231	Mean in Log Scale	-2.913
SD in Original Scale	0.725	SD in Log Scale	1.373
95% t UCL (Assumes normality)	0.425	95% H-Stat UCL	0.262
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0264	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|diethyl phthalate|)			
General Statistics			
Total Number of Observations	20	Number of Distinct Observations	14
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	4	Number of Distinct Non-Detects	10
Minimum Detect	0.0595	Minimum Non-Detect	0.056
Maximum Detect	0.0788	Maximum Non-Detect	6.6
Variance Detects	8.3229E-5	Percent Non-Detects	80%
Mean Detects	0.0696	SD Detects	0.00912
Median Detects	0.07	CV Detects	0.131
Skewness Detects	-0.138	Kurtosis Detects	-4.078
Mean of Logged Detects	-2.672	SD of Logged Detects	0.133
Normal GOF Test on Detects Only			

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0651	Standard Error of Mean	0.00428
SD	0.00909	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0725	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0721	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0779	95% KM Chebyshev UCL	0.0837
97.5% KM Chebyshev UCL	0.0918	99% KM Chebyshev UCL	0.108
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.344	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.281	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	76.61	k star (bias corrected MLE)	19.32
Theta hat (MLE)	9.0814E-4	Theta star (bias corrected MLE)	0.0036
nu hat (MLE)	612.9	nu star (bias corrected)	154.6
MLE Mean (bias corrected)	0.0696	MLE Sd (bias corrected)	0.0158
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	51.25	nu hat (KM)	2050
Approximate Chi Square Value (N/A, α)	1946	Adjusted Chi Square Value (N/A, β)	1938
95% Gamma Approximate KM-UCL (use when n>=50)	0.0685	95% Gamma Adjusted KM-UCL (use when n<50)	0.0688
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0461	Mean	0.0616
Maximum	0.0788	Median	0.0615
SD	0.00948	CV	0.154
k hat (MLE)	43.68	k star (bias corrected MLE)	37.16
Theta hat (MLE)	0.00141	Theta star (bias corrected MLE)	0.00166
nu hat (MLE)	1747	nu star (bias corrected)	1486
MLE Mean (bias corrected)	0.0616	MLE Sd (bias corrected)	0.0101
		Adjusted Level of Significance (β)	0.038

Approximate Chi Square Value (N/A, α)	1398	Adjusted Chi Square Value (N/A, β)	1391
95% Gamma Approximate UCL (use when n>=50)	0.0655	95% Gamma Adjusted UCL (use when n<50)	N/A
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.062	Mean in Log Scale	-2.791
SD in Original Scale	0.00885	SD in Log Scale	0.143
95% t UCL (assumes normality of ROS data)	0.0654	95% Percentile Bootstrap UCL	0.0653
95% BCA Bootstrap UCL	0.0652	95% Bootstrap t UCL	0.0656
95% H-UCL (Log ROS)	0.0657		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.742	95% H-UCL (KM -Log)	0.0687
KM SD (logged)	0.136	95% Critical H Value (KM-Log)	1.751
KM Standard Error of Mean (logged)	0.0643		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.369	Mean in Log Scale	-2.072
SD in Original Scale	0.782	SD in Log Scale	1.276
95% t UCL (Assumes normality)	0.672	95% H-Stat UCL	0.696
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0725	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|fluoranthene|)			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	26

Number of Detects	13	Number of Non-Detects	27
Number of Distinct Detects	12	Number of Distinct Non-Detects	15
Minimum Detect	0.054	Minimum Non-Detect	0.02
Maximum Detect	1.4	Maximum Non-Detect	6.6
Variance Detects	0.126	Percent Non-Detects	67.5%
Mean Detects	0.274	SD Detects	0.355
Median Detects	0.17	CV Detects	1.296
Skewness Detects	3.078	Kurtosis Detects	10.13
Mean of Logged Detects	-1.711	SD of Logged Detects	0.845
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.568	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.351	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.118	Standard Error of Mean	0.0399
SD	0.233	95% KM (BCA) UCL	0.199
95% KM (t) UCL	0.186	95% KM (Percentile Bootstrap) UCL	0.196
95% KM (z) UCL	0.184	95% KM Bootstrap t UCL	0.266
90% KM Chebyshev UCL	0.238	95% KM Chebyshev UCL	0.292
97.5% KM Chebyshev UCL	0.367	99% KM Chebyshev UCL	0.515
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.912	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.752	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.289	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.242	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.347	k star (bias corrected MLE)	1.088
Theta hat (MLE)	0.203	Theta star (bias corrected MLE)	0.252
nu hat (MLE)	35.03	nu star (bias corrected)	28.28
MLE Mean (bias corrected)	0.274	MLE Sd (bias corrected)	0.262
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.259	nu hat (KM)	20.71
Approximate Chi Square Value (20.71, α)	11.38	Adjusted Chi Square Value (20.71, β)	11.12
95% Gamma Approximate KM-UCL (use when n>=50)	0.215	95% Gamma Adjusted KM-UCL (use when n<50)	0.22
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			

GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0957
Maximum	1.4	Median	0.01
SD	0.233	CV	2.437
k hat (MLE)	0.484	k star (bias corrected MLE)	0.465
Theta hat (MLE)	0.198	Theta star (bias corrected MLE)	0.206
nu hat (MLE)	38.75	nu star (bias corrected)	37.18
MLE Mean (bias corrected)	0.0957	MLE Sd (bias corrected)	0.14
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (37.18, α)	24.22	Adjusted Chi Square Value (37.18, β)	23.82
95% Gamma Approximate UCL (use when n>=50)	0.147	95% Gamma Adjusted UCL (use when n<50)	0.149
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.222	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.11	Mean in Log Scale	-2.992
SD in Original Scale	0.228	SD in Log Scale	1.123
95% t UCL (assumes normality of ROS data)	0.171	95% Percentile Bootstrap UCL	0.176
95% BCA Bootstrap UCL	0.23	95% Bootstrap t UCL	0.268
95% H-UCL (Log ROS)	0.149		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.978	95% H-UCL (KM -Log)	0.162
KM SD (logged)	1.162	95% Critical H Value (KM-Log)	2.603
KM Standard Error of Mean (logged)	0.217		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.271	Mean in Log Scale	-2.448
SD in Original Scale	0.596	SD in Log Scale	1.436
95% t UCL (Assumes normality)	0.43	95% H-Stat UCL	0.479
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.186	95% KM (% Bootstrap) UCL	0.196

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
Recommendations are based upon data size, data distribution, and skewness.						
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).						
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
Conc (|soil|0-3|indeno(1,2,3-c,d) pyrene|)						
General Statistics						
Total Number of Observations	40			Number of Distinct Observations	21	
Number of Detects	9			Number of Non-Detects	31	
Number of Distinct Detects	7			Number of Distinct Non-Detects	14	
Minimum Detect	0.025			Minimum Non-Detect	0.02	
Maximum Detect	1.7			Maximum Non-Detect	6.6	
Variance Detects	0.285			Percent Non-Detects	77.5%	
Mean Detects	0.281			SD Detects	0.534	
Median Detects	0.12			CV Detects	1.9	
Skewness Detects	2.96			Kurtosis Detects	8.825	
Mean of Logged Detects	-2.085			SD of Logged Detects	1.155	
Normal GOF Test on Detects Only						
Shapiro Wilk Test Statistic	0.469			**Shapiro Wilk GOF Test**		
5% Shapiro Wilk Critical Value	0.829			Detected Data Not Normal at 5% Significance Level		
Lilliefors Test Statistic	0.486			**Lilliefors GOF Test**		
5% Lilliefors Critical Value	0.295			Detected Data Not Normal at 5% Significance Level		
Detected Data Not Normal at 5% Significance Level						
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs						
Mean	0.0917			Standard Error of Mean	0.0465	
SD	0.268			95% KM (BCA) UCL	0.188	
95% KM (t) UCL	0.17			95% KM (Percentile Bootstrap) UCL	0.172	
95% KM (z) UCL	0.168			95% KM Bootstrap t UCL	0.401	
90% KM Chebyshev UCL	0.231			95% KM Chebyshev UCL	0.294	
97.5% KM Chebyshev UCL	0.382			99% KM Chebyshev UCL	0.554	
Gamma GOF Tests on Detected Observations Only						
A-D Test Statistic	1.341			**Anderson-Darling GOF Test**		
5% A-D Critical Value	0.753			Detected Data Not Gamma Distributed at 5% Significance Level		
K-S Test Statistic	0.421			**Kolmogrov-Smirnoff GOF**		
5% K-S Critical Value	0.29			Detected Data Not Gamma Distributed at 5% Significance Level		
Detected Data Not Gamma Distributed at 5% Significance Level						
Gamma Statistics on Detected Data Only						
k hat (MLE)	0.736			k star (bias corrected MLE)	0.565	
Theta hat (MLE)	0.382			Theta star (bias corrected MLE)	0.498	

nu hat (MLE)	13.24	nu star (bias corrected)	10.16
MLE Mean (bias corrected)	0.281	MLE Sd (bias corrected)	0.374
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.117	nu hat (KM)	9.362
Approximate Chi Square Value (9.36, α)	3.547	Adjusted Chi Square Value (9.36, β)	3.413
95% Gamma Approximate KM-UCL (use when n>=50)	0.242	95% Gamma Adjusted KM-UCL (use when n<50)	0.252
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0714
Maximum	1.7	Median	0.01
SD	0.268	CV	3.746
k hat (MLE)	0.467	k star (bias corrected MLE)	0.449
Theta hat (MLE)	0.153	Theta star (bias corrected MLE)	0.159
nu hat (MLE)	37.39	nu star (bias corrected)	35.92
MLE Mean (bias corrected)	0.0714	MLE Sd (bias corrected)	0.107
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (35.92, α)	23.2	Adjusted Chi Square Value (35.92, β)	22.82
95% Gamma Approximate UCL (use when n>=50)	0.111	95% Gamma Adjusted UCL (use when n<50)	0.112
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.324	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0755	Mean in Log Scale	-3.972
SD in Original Scale	0.267	SD in Log Scale	1.394
95% t UCL (assumes normality of ROS data)	0.147	95% Percentile Bootstrap UCL	0.159
95% BCA Bootstrap UCL	0.207	95% Bootstrap t UCL	0.447
95% H-UCL (Log ROS)	0.0951		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.268	95% H-UCL (KM -Log)	0.0884
KM SD (logged)	0.972	95% Critical H Value (KM-Log)	2.375
KM Standard Error of Mean (logged)	0.195		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	

Mean in Original Scale	0.256	Mean in Log Scale	-2.608
SD in Original Scale	0.615	SD in Log Scale	1.401
95% t UCL (Assumes normality)	0.42	95% H-Stat UCL	0.378
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.188		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|lead|)			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	44
		Number of Missing Observations	0
Minimum	6.4	Mean	940.2
Maximum	10000	Median	291
SD	1761	Std. Error of Mean	262.5
Coefficient of Variation	1.873	Skewness	3.65
Normal GOF Test			
Shapiro Wilk Test Statistic	0.563	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.298	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.132	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1381	95% Adjusted-CLT UCL (Chen-1995)	1525
		95% Modified-t UCL (Johnson-1978)	1405
Gamma GOF Test			
A-D Test Statistic	0.761	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.83	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.106	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.141	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	0.43	k star (bias corrected MLE)	0.416
Theta hat (MLE)	2188	Theta star (bias corrected MLE)	2261
nu hat (MLE)	38.67	nu star (bias corrected)	37.43
MLE Mean (bias corrected)	940.2	MLE Sd (bias corrected)	1458
		Approximate Chi Square Value (0.05)	24.42
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	24.07
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	1441	95% Adjusted Gamma UCL (use when n<50)	1462
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.112	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.132	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.856	Mean of logged Data	5.332
Maximum of Logged Data	9.21	SD of logged Data	2.056
Assuming Lognormal Distribution			
95% H-UCL	5512	90% Chebyshev (MVUE) UCL	3509
95% Chebyshev (MVUE) UCL	4418	97.5% Chebyshev (MVUE) UCL	5678
99% Chebyshev (MVUE) UCL	8155		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1372	95% Jackknife UCL	1381
95% Standard Bootstrap UCL	1379	95% Bootstrap-t UCL	1761
95% Hall's Bootstrap UCL	2890	95% Percentile Bootstrap UCL	1381
95% BCA Bootstrap UCL	1569		
90% Chebyshev(Mean, Sd) UCL	1728	95% Chebyshev(Mean, Sd) UCL	2085
97.5% Chebyshev(Mean, Sd) UCL	2580	99% Chebyshev(Mean, Sd) UCL	3552
Suggested UCL to Use			
95% Adjusted Gamma UCL	1462		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

Conc (|soil|0-3|naphthalene|)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	16
Number of Detects	2	Number of Non-Detects	38
Number of Distinct Detects	2	Number of Distinct Non-Detects	15
Minimum Detect	0.02	Minimum Non-Detect	0.02
Maximum Detect	0.059	Maximum Non-Detect	6.6
Variance Detects	7.6050E-4	Percent Non-Detects	95%
Mean Detects	0.0395	SD Detects	0.0276
Median Detects	0.0395	CV Detects	0.698
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.371	SD of Logged Detects	0.765

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0235	Standard Error of Mean	0.00478
SD	0.0112	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0316	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0314	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0379	95% KM Chebyshev UCL	0.0444
97.5% KM Chebyshev UCL	0.0534	99% KM Chebyshev UCL	0.0711

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.738	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0106	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	14.95	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	4.41	nu hat (KM)	352.8
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (352.83, α)	310.3	Adjusted Chi Square Value (352.83, β)	308.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.0268	95% Gamma Adjusted KM-UCL (use when n<50)	0.0269

Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00854	Mean in Log Scale	-5.155
SD in Original Scale	0.01	SD in Log Scale	0.855
95% t UCL (assumes normality of ROS data)	0.0112	95% Percentile Bootstrap UCL	0.0114
95% BCA Bootstrap UCL	0.0127	95% Bootstrap t UCL	0.0132
95% H-UCL (Log ROS)	0.0113		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.217	Mean in Log Scale	-2.705
SD in Original Scale	0.57	SD in Log Scale	1.331
95% t UCL (Assumes normality)	0.369	95% H-Stat UCL	0.296
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0316	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|phenanthrene|)			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	22
Number of Detects	9	Number of Non-Detects	31
Number of Distinct Detects	8	Number of Distinct Non-Detects	15
Minimum Detect	0.048	Minimum Non-Detect	0.02
Maximum Detect	0.26	Maximum Non-Detect	6.6
Variance Detects	0.00598	Percent Non-Detects	77.5%
Mean Detects	0.141	SD Detects	0.0773
Median Detects	0.11	CV Detects	0.55
Skewness Detects	0.816	Kurtosis Detects	-0.803
Mean of Logged Detects	-2.095	SD of Logged Detects	0.554
Normal GOF Test on Detects Only			

Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0633	Standard Error of Mean	0.0137
SD	0.0671	95% KM (BCA) UCL	0.0941
95% KM (t) UCL	0.0864	95% KM (Percentile Bootstrap) UCL	0.0898
95% KM (z) UCL	0.0859	95% KM Bootstrap t UCL	0.0865
90% KM Chebyshev UCL	0.104	95% KM Chebyshev UCL	0.123
97.5% KM Chebyshev UCL	0.149	99% KM Chebyshev UCL	0.2
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.463	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.22	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.281	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.892	k star (bias corrected MLE)	2.669
Theta hat (MLE)	0.0361	Theta star (bias corrected MLE)	0.0527
nu hat (MLE)	70.05	nu star (bias corrected)	48.03
MLE Mean (bias corrected)	0.141	MLE Sd (bias corrected)	0.0861
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.891	nu hat (KM)	71.29
Approximate Chi Square Value (71.29, α)	52.85	Adjusted Chi Square Value (71.29, β)	52.25
95% Gamma Approximate KM-UCL (use when n>=50)	0.0854	95% Gamma Adjusted KM-UCL (use when n<50)	0.0864
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0488
Maximum	0.26	Median	0.0216
SD	0.0638	CV	1.307
k hat (MLE)	0.928	k star (bias corrected MLE)	0.875
Theta hat (MLE)	0.0526	Theta star (bias corrected MLE)	0.0558
nu hat (MLE)	74.22	nu star (bias corrected)	69.99
MLE Mean (bias corrected)	0.0488	MLE Sd (bias corrected)	0.0522
		Adjusted Level of Significance (β)	0.044

Approximate Chi Square Value (69.99, α)	51.73	Adjusted Chi Square Value (69.99, β)	51.14
95% Gamma Approximate UCL (use when n>=50)	0.0661	95% Gamma Adjusted UCL (use when n<50)	0.0668
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0623	Mean in Log Scale	-3.047
SD in Original Scale	0.0573	SD in Log Scale	0.696
95% t UCL (assumes normality of ROS data)	0.0776	95% Percentile Bootstrap UCL	0.0772
95% BCA Bootstrap UCL	0.0821	95% Bootstrap t UCL	0.0852
95% H-UCL (Log ROS)	0.0764		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.2	95% H-UCL (KM -Log)	0.0837
KM SD (logged)	0.888	95% Critical H Value (KM-Log)	2.282
KM Standard Error of Mean (logged)	0.201		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.236	Mean in Log Scale	-2.441
SD in Original Scale	0.566	SD in Log Scale	1.248
95% t UCL (Assumes normality)	0.387	95% H-Stat UCL	0.326
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0864	95% KM (Percentile Bootstrap) UCL	0.0898
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|pyrene|)			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	28
Number of Detects	15	Number of Non-Detects	25

Number of Distinct Detects	14	Number of Distinct Non-Detects	14
Minimum Detect	0.07	Minimum Non-Detect	0.02
Maximum Detect	1.6	Maximum Non-Detect	6.6
Variance Detects	0.143	Percent Non-Detects	62.5%
Mean Detects	0.315	SD Detects	0.378
Median Detects	0.23	CV Detects	1.198
Skewness Detects	3.168	Kurtosis Detects	10.97
Mean of Logged Detects	-1.52	SD of Logged Detects	0.803
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.582	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.348	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.229	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.149	Standard Error of Mean	0.0461
SD	0.27	95% KM (BCA) UCL	0.253
95% KM (t) UCL	0.227	95% KM (Percentile Bootstrap) UCL	0.232
95% KM (z) UCL	0.225	95% KM Bootstrap t UCL	0.3
90% KM Chebyshev UCL	0.287	95% KM Chebyshev UCL	0.35
97.5% KM Chebyshev UCL	0.437	99% KM Chebyshev UCL	0.608
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.827	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.754	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.264	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.225	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.512	k star (bias corrected MLE)	1.254
Theta hat (MLE)	0.209	Theta star (bias corrected MLE)	0.252
nu hat (MLE)	45.35	nu star (bias corrected)	37.61
MLE Mean (bias corrected)	0.315	MLE Sd (bias corrected)	0.282
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.304	nu hat (KM)	24.3
Approximate Chi Square Value (24.30, α)	14.08	Adjusted Chi Square Value (24.30, β)	13.79
95% Gamma Approximate KM-UCL (use when n>=50)	0.257	95% Gamma Adjusted KM-UCL (use when n<50)	0.263
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			

For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.125
Maximum	1.6	Median	0.01
SD	0.271	CV	2.168
k hat (MLE)	0.478	k star (bias corrected MLE)	0.459
Theta hat (MLE)	0.262	Theta star (bias corrected MLE)	0.273
nu hat (MLE)	38.22	nu star (bias corrected)	36.68
MLE Mean (bias corrected)	0.125	MLE Sd (bias corrected)	0.185
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (36.68, α)	23.82	Adjusted Chi Square Value (36.68, β)	23.43
95% Gamma Approximate UCL (use when n>=50)	0.193	95% Gamma Adjusted UCL (use when n<50)	0.196
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.145	Mean in Log Scale	-2.617
SD in Original Scale	0.263	SD in Log Scale	1.079
95% t UCL (assumes normality of ROS data)	0.216	95% Percentile Bootstrap UCL	0.221
95% BCA Bootstrap UCL	0.27	95% Bootstrap t UCL	0.324
95% H-UCL (Log ROS)	0.201		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.802	95% H-UCL (KM -Log)	0.238
KM SD (logged)	1.272	95% Critical H Value (KM-Log)	2.743
KM Standard Error of Mean (logged)	0.23		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.296	Mean in Log Scale	-2.341
SD in Original Scale	0.605	SD in Log Scale	1.487
95% t UCL (Assumes normality)	0.457	95% H-Stat UCL	0.599
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.227	95% KM (% Bootstrap) UCL	0.232

Appendix C - ProUCL Output

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|0-3|tphd|)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	36
Number of Detects	35	Number of Non-Detects	6
Number of Distinct Detects	32	Number of Distinct Non-Detects	4
Minimum Detect	2.55	Minimum Non-Detect	2.4
Maximum Detect	430	Maximum Non-Detect	10
Variance Detects	6634	Percent Non-Detects	14.63%
Mean Detects	58.95	SD Detects	81.45
Median Detects	39	CV Detects	1.382
Skewness Detects	3.128	Kurtosis Detects	12.43
Mean of Logged Detects	3.298	SD of Logged Detects	1.36

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.665	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.244	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.15	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	50.77	Standard Error of Mean	12.16
SD	76.76	95% KM (BCA) UCL	71.4
95% KM (t) UCL	71.25	95% KM (Percentile Bootstrap) UCL	71.69
95% KM (z) UCL	70.78	95% KM Bootstrap t UCL	86.03
90% KM Chebyshev UCL	87.26	95% KM Chebyshev UCL	103.8
97.5% KM Chebyshev UCL	126.7	99% KM Chebyshev UCL	171.8

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.529	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.787	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.131	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.154	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.766	k star (bias corrected MLE)	0.72
Theta hat (MLE)	76.92	Theta star (bias corrected MLE)	81.91
nu hat (MLE)	53.64	nu star (bias corrected)	50.38

MLE Mean (bias corrected)	58.95	MLE Sd (bias corrected)	69.49
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.438	nu hat (KM)	35.88
Approximate Chi Square Value (35.88, α)	23.17	Adjusted Chi Square Value (35.88, β)	22.8
95% Gamma Approximate KM-UCL (use when n>=50)	78.62	95% Gamma Adjusted KM-UCL (use when n<50)	79.91
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	50.32
Maximum	430	Median	23
SD	78	CV	1.55
k hat (MLE)	0.374	k star (bias corrected MLE)	0.363
Theta hat (MLE)	134.5	Theta star (bias corrected MLE)	138.6
nu hat (MLE)	30.69	nu star (bias corrected)	29.78
MLE Mean (bias corrected)	50.32	MLE Sd (bias corrected)	83.51
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (29.78, α)	18.32	Adjusted Chi Square Value (29.78, β)	17.99
95% Gamma Approximate UCL (use when n>=50)	81.81	95% Gamma Adjusted UCL (use when n<50)	83.3
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.934	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	50.69	Mean in Log Scale	2.92
SD in Original Scale	77.77	SD in Log Scale	1.578
95% t UCL (assumes normality of ROS data)	71.14	95% Percentile Bootstrap UCL	71.95
95% BCA Bootstrap UCL	78	95% Bootstrap t UCL	85.77
95% H-UCL (Log ROS)	138.2		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	2.971	95% H-UCL (KM -Log)	114.1
KM SD (logged)	1.473	95% Critical H Value (KM-Log)	2.921
KM Standard Error of Mean (logged)	0.234		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	50.69	Mean in Log Scale	2.931

SD in Original Scale	77.77	SD in Log Scale	1.553
95% t UCL (Assumes normality)	71.14	95% H-Stat UCL	131.6
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	103.8	95% GROS Adjusted Gamma UCL	83.3
95% Adjusted Gamma KM-UCL	79.91		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|0-3|tphmo|)			
General Statistics			
Total Number of Observations	41	Number of Distinct Observations	31
Number of Detects	28	Number of Non-Detects	13
Number of Distinct Detects	27	Number of Distinct Non-Detects	5
Minimum Detect	8.3	Minimum Non-Detect	4.8
Maximum Detect	1200	Maximum Non-Detect	25
Variance Detects	75149	Percent Non-Detects	31.71%
Mean Detects	186.3	SD Detects	274.1
Median Detects	96	CV Detects	1.471
Skewness Detects	2.755	Kurtosis Detects	7.783
Mean of Logged Detects	4.498	SD of Logged Detects	1.24
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.62	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.296	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	129	Standard Error of Mean	37.83
SD	237.9	95% KM (BCA) UCL	200.9
95% KM (t) UCL	192.7	95% KM (Percentile Bootstrap) UCL	195.6
95% KM (z) UCL	191.2	95% KM Bootstrap t UCL	251.5
90% KM Chebyshev UCL	242.5	95% KM Chebyshev UCL	293.9
97.5% KM Chebyshev UCL	365.2	99% KM Chebyshev UCL	505.4

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.797	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.782	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.184	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.171	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.812	k star (bias corrected MLE)	0.748
Theta hat (MLE)	229.6	Theta star (bias corrected MLE)	249
nu hat (MLE)	45.45	nu star (bias corrected)	41.91
MLE Mean (bias corrected)	186.3	MLE Sd (bias corrected)	215.4
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.294	nu hat (KM)	24.11
Approximate Chi Square Value (24.11, α)	13.93	Adjusted Chi Square Value (24.11, β)	13.65
95% Gamma Approximate KM-UCL (use when n>=50)	223.2	95% Gamma Adjusted KM-UCL (use when n<50)	227.8
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	127.3
Maximum	1200	Median	53
SD	241.7	CV	1.899
k hat (MLE)	0.224	k star (bias corrected MLE)	0.223
Theta hat (MLE)	569.3	Theta star (bias corrected MLE)	569.5
nu hat (MLE)	18.33	nu star (bias corrected)	18.32
MLE Mean (bias corrected)	127.3	MLE Sd (bias corrected)	269.2
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (18.32, α)	9.625	Adjusted Chi Square Value (18.32, β)	9.394
95% Gamma Approximate UCL (use when n>=50)	242.3	95% Gamma Adjusted UCL (use when n<50)	248.2
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.097	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	129.2	Mean in Log Scale	3.595
SD in Original Scale	240.7	SD in Log Scale	1.714
95% t UCL (assumes normality of ROS data)	192.5	95% Percentile Bootstrap UCL	194.1

95% BCA Bootstrap UCL	215.8	95% Bootstrap t UCL	253.9
95% H-UCL (Log ROS)	380.9		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.591	95% H-UCL (KM -Log)	343.4
KM SD (logged)	1.675	95% Critical H Value (KM-Log)	3.189
KM Standard Error of Mean (logged)	0.267		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	128.7	Mean in Log Scale	3.489
SD in Original Scale	241	SD in Log Scale	1.843
95% t UCL (Assumes normality)	192.1	95% H-Stat UCL	485.4
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	293.9		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|gw|benzene|)			
General Statistics			
Total Number of Observations	43	Number of Distinct Observations	36
Number of Detects	37	Number of Non-Detects	6
Number of Distinct Detects	34	Number of Distinct Non-Detects	2
Minimum Detect	1.1	Minimum Non-Detect	0.5
Maximum Detect	6200	Maximum Non-Detect	5
Variance Detects	2681904	Percent Non-Detects	13.95%
Mean Detects	1033	SD Detects	1638
Median Detects	420	CV Detects	1.585
Skewness Detects	2.161	Kurtosis Detects	3.733
Mean of Logged Detects	5.321	SD of Logged Detects	2.482
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.64	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.302	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.146	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	889.1	Standard Error of Mean	238.2
SD	1541	95% KM (BCA) UCL	1279
95% KM (t) UCL	1290	95% KM (Percentile Bootstrap) UCL	1308
95% KM (z) UCL	1281	95% KM Bootstrap t UCL	1456
90% KM Chebyshev UCL	1604	95% KM Chebyshev UCL	1927
97.5% KM Chebyshev UCL	2377	99% KM Chebyshev UCL	3259
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.484	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.834	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.109	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.155	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.406	k star (bias corrected MLE)	0.391
Theta hat (MLE)	2548	Theta star (bias corrected MLE)	2645
nu hat (MLE)	30.01	nu star (bias corrected)	28.91
MLE Mean (bias corrected)	1033	MLE Sd (bias corrected)	1653
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.333	nu hat (KM)	28.65
Approximate Chi Square Value (28.65, α)	17.43	Adjusted Chi Square Value (28.65, β)	17.13
95% Gamma Approximate KM-UCL (use when n>=50)	1461	95% Gamma Adjusted KM-UCL (use when n<50)	1487
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	889.1
Maximum	6200	Median	320
SD	1559	CV	1.753
k hat (MLE)	0.249	k star (bias corrected MLE)	0.247
Theta hat (MLE)	3570	Theta star (bias corrected MLE)	3597
nu hat (MLE)	21.42	nu star (bias corrected)	21.26
MLE Mean (bias corrected)	889.1	MLE Sd (bias corrected)	1788
		Adjusted Level of Significance (β)	0.0444
Approximate Chi Square Value (21.26, α)	11.78	Adjusted Chi Square Value (21.26, β)	11.54
95% Gamma Approximate UCL (use when n>=50)	1604	95% Gamma Adjusted UCL (use when n<50)	1638
Lognormal GOF Test on Detected Observations Only			

Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.146	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	889.3	Mean in Log Scale	4.597
SD in Original Scale	1559	SD in Log Scale	2.951
95% t UCL (assumes normality of ROS data)	1289	95% Percentile Bootstrap UCL	1299
95% BCA Bootstrap UCL	1372	95% Bootstrap t UCL	1451
95% H-UCL (Log ROS)	77908		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	889.1	Mean in Log Scale	4.439
SD in Original Scale	1559	SD in Log Scale	3.21
95% t UCL (Assumes normality)	1289	95% H-Stat UCL	220362
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	1927	95% GROS Adjusted Gamma UCL	1638
95% Adjusted Gamma KM-UCL	1487		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|gw|dipe|)			
General Statistics			
Total Number of Observations	14	Number of Distinct Observations	9
Number of Detects	2	Number of Non-Detects	12
Number of Distinct Detects	2	Number of Distinct Non-Detects	7
Minimum Detect	2.3	Minimum Non-Detect	0.5
Maximum Detect	16	Maximum Non-Detect	50
Variance Detects	93.85	Percent Non-Detects	85.71%
Mean Detects	9.15	SD Detects	9.687
Median Detects	9.15	CV Detects	1.059
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	1.803	SD of Logged Detects	1.372

Warning: Data set has only 2 Detected Values.			
This is not enough to compute meaningful or reliable statistics and estimates.			
Normal GOF Test on Detects Only			
Not Enough Data to Perform GOF Test			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	2.455	Standard Error of Mean	2.079
SD	4.575	95% KM (BCA) UCL	N/A
95% KM (t) UCL	6.137	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	5.875	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	8.693	95% KM Chebyshev UCL	11.52
97.5% KM Chebyshev UCL	15.44	99% KM Chebyshev UCL	23.14
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.359	k star (bias corrected MLE)	N/A
Theta hat (MLE)	6.733	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	5.436	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.288	nu hat (KM)	8.062
		Adjusted Level of Significance (β)	0.0312
Approximate Chi Square Value (8.06, α)	2.771	Adjusted Chi Square Value (8.06, β)	2.376
95% Gamma Approximate KM-UCL (use when n>=50)	7.143	95% Gamma Adjusted KM-UCL (use when n<50)	8.329
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.642	Mean in Log Scale	-0.918
SD in Original Scale	4.178	SD in Log Scale	1.51
95% t UCL (assumes normality of ROS data)	3.62	95% Percentile Bootstrap UCL	3.823
95% BCA Bootstrap UCL	5.054	95% Bootstrap t UCL	16.61
95% H-UCL (Log ROS)	5.91		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	7.396	Mean in Log Scale	1.176
SD in Original Scale	8.735	SD in Log Scale	1.503

95% t UCL (Assumes normality)	11.53	95% H-Stat UCL	46.79
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|gw|ethylbenzene|)			
General Statistics			
Total Number of Observations	43	Number of Distinct Observations	36
Number of Detects	35	Number of Non-Detects	8
Number of Distinct Detects	32	Number of Distinct Non-Detects	4
Minimum Detect	1.5	Minimum Non-Detect	0.5
Maximum Detect	5900	Maximum Non-Detect	5
Variance Detects	3951035	Percent Non-Detects	18.6%
Mean Detects	1246	SD Detects	1988
Median Detects	60	CV Detects	1.595
Skewness Detects	1.267	Kurtosis Detects	-0.0604
Mean of Logged Detects	4.579	SD of Logged Detects	2.739
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.65	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.388	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	1014	Standard Error of Mean	283.6
SD	1833	95% KM (BCA) UCL	1512
95% KM (t) UCL	1491	95% KM (Percentile Bootstrap) UCL	1483
95% KM (z) UCL	1481	95% KM Bootstrap t UCL	1605
90% KM Chebyshev UCL	1865	95% KM Chebyshev UCL	2250
97.5% KM Chebyshev UCL	2785	99% KM Chebyshev UCL	3836
Gamma GOF Tests on Detected Observations Only			

A-D Test Statistic	2.363	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.869	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.226	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.162	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.274	k star (bias corrected MLE)	0.27
Theta hat (MLE)	4539	Theta star (bias corrected MLE)	4614
nu hat (MLE)	19.21	nu star (bias corrected)	18.9
MLE Mean (bias corrected)	1246	MLE Sd (bias corrected)	2398
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.306	nu hat (KM)	26.34
Approximate Chi Square Value (26.34, α)	15.64	Adjusted Chi Square Value (26.34, β)	15.35
95% Gamma Approximate KM-UCL (use when n>=50)	1708	95% Gamma Adjusted KM-UCL (use when n<50)	1740
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1014
Maximum	5900	Median	21
SD	1854	CV	1.829
k hat (MLE)	0.184	k star (bias corrected MLE)	0.187
Theta hat (MLE)	5512	Theta star (bias corrected MLE)	5433
nu hat (MLE)	15.82	nu star (bias corrected)	16.05
MLE Mean (bias corrected)	1014	MLE Sd (bias corrected)	2347
		Adjusted Level of Significance (β)	0.0444
Approximate Chi Square Value (16.05, α)	7.999	Adjusted Chi Square Value (16.05, β)	7.801
95% Gamma Approximate UCL (use when n>=50)	2035	95% Gamma Adjusted UCL (use when n<50)	2087
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.173	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1014	Mean in Log Scale	3.475
SD in Original Scale	1854	SD in Log Scale	3.422
95% t UCL (assumes normality of ROS data)	1490	95% Percentile Bootstrap UCL	1502
95% BCA Bootstrap UCL	1592	95% Bootstrap t UCL	1588

95% H-UCL (Log ROS)	241083		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1014	Mean in Log Scale	3.592
SD in Original Scale	1854	SD in Log Scale	3.253
95% t UCL (Assumes normality)	1490	95% H-Stat UCL	116498
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
99% KM (Chebyshev) UCL	3836		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|gw|toluene|)			
General Statistics			
Total Number of Observations	43	Number of Distinct Observations	29
Number of Detects	24	Number of Non-Detects	19
Number of Distinct Detects	23	Number of Distinct Non-Detects	6
Minimum Detect	2.5	Minimum Non-Detect	0.5
Maximum Detect	5800	Maximum Non-Detect	50
Variance Detects	3512419	Percent Non-Detects	44.19%
Mean Detects	846.1	SD Detects	1874
Median Detects	23.5	CV Detects	2.215
Skewness Detects	2.007	Kurtosis Detects	2.406
Mean of Logged Detects	3.707	SD of Logged Detects	2.504
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.494	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.48	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.181	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	472.8	Standard Error of Mean	223.3
SD	1433	95% KM (BCA) UCL	831.4
95% KM (t) UCL	848.4	95% KM (Percentile Bootstrap) UCL	841.6

95% KM (z) UCL	840.1	95% KM Bootstrap t UCL	1225
90% KM Chebyshev UCL	1143	95% KM Chebyshev UCL	1446
97.5% KM Chebyshev UCL	1867	99% KM Chebyshev UCL	2695
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	3.089	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.881	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.326	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.196	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.236	k star (bias corrected MLE)	0.235
Theta hat (MLE)	3581	Theta star (bias corrected MLE)	3607
nu hat (MLE)	11.34	nu star (bias corrected)	11.26
MLE Mean (bias corrected)	846.1	MLE Sd (bias corrected)	1747
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.109	nu hat (KM)	9.357
Approximate Chi Square Value (9.36, α)	3.544	Adjusted Chi Square Value (9.36, β)	3.42
95% Gamma Approximate KM-UCL (use when n>=50)	1248	95% Gamma Adjusted KM-UCL (use when n<50)	1294
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	472.2
Maximum	5800	Median	3
SD	1451	CV	3.072
k hat (MLE)	0.128	k star (bias corrected MLE)	0.135
Theta hat (MLE)	3680	Theta star (bias corrected MLE)	3501
nu hat (MLE)	11.04	nu star (bias corrected)	11.6
MLE Mean (bias corrected)	472.2	MLE Sd (bias corrected)	1286
		Adjusted Level of Significance (β)	0.0444
Approximate Chi Square Value (11.60, α)	4.965	Adjusted Chi Square Value (11.60, β)	4.814
95% Gamma Approximate UCL (use when n>=50)	1103	95% Gamma Adjusted UCL (use when n<50)	1138
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.181	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	472.4	Mean in Log Scale	1.222
SD in Original Scale	1451	SD in Log Scale	3.569
95% t UCL (assumes normality of ROS data)	844.5	95% Percentile Bootstrap UCL	854.8
95% BCA Bootstrap UCL	1030	95% Bootstrap t UCL	1229
95% H-UCL (Log ROS)	54734		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	1.901	95% H-UCL (KM -Log)	2587
KM SD (logged)	2.786	95% Critical H Value (KM-Log)	4.828
KM Standard Error of Mean (logged)	0.441		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	473.6	Mean in Log Scale	2.024
SD in Original Scale	1450	SD in Log Scale	2.848
95% t UCL (Assumes normality)	845.5	95% H-Stat UCL	3799
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
99% KM (Chebyshev) UCL	2695		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|gw|tphg|)			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	35
		Number of Missing Observations	3
Number of Detects	36	Number of Non-Detects	4
Number of Distinct Detects	35	Number of Distinct Non-Detects	1
Minimum Detect	50	Minimum Non-Detect	50
Maximum Detect	99000	Maximum Non-Detect	50
Variance Detects	7.466E+8	Percent Non-Detects	10%
Mean Detects	18373	SD Detects	27323
Median Detects	6000	CV Detects	1.487
Skewness Detects	1.734	Kurtosis Detects	1.878
Mean of Logged Detects	8.634	SD of Logged Detects	1.746

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.674	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.935	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.356	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.148	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	16541	Standard Error of Mean	4192
SD	26143	95% KM (BCA) UCL	24083
95% KM (t) UCL	23604	95% KM (Percentile Bootstrap) UCL	23779
95% KM (z) UCL	23436	95% KM Bootstrap t UCL	25318
90% KM Chebyshev UCL	29117	95% KM Chebyshev UCL	34814
97.5% KM Chebyshev UCL	42721	99% KM Chebyshev UCL	58253
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.274	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.809	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.199	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.155	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.531	k star (bias corrected MLE)	0.505
Theta hat (MLE)	34590	Theta star (bias corrected MLE)	36352
nu hat (MLE)	38.24	nu star (bias corrected)	36.39
MLE Mean (bias corrected)	18373	MLE Sd (bias corrected)	25844
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.4	nu hat (KM)	32.02
Approximate Chi Square Value (32.02, α)	20.09	Adjusted Chi Square Value (32.02, β)	19.74
95% Gamma Approximate KM-UCL (use when n>=50)	26365	95% Gamma Adjusted KM-UCL (use when n<50)	26839
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	16536
Maximum	99000	Median	5100
SD	26479	CV	1.601
k hat (MLE)	0.289	k star (bias corrected MLE)	0.284
Theta hat (MLE)	57271	Theta star (bias corrected MLE)	58278
nu hat (MLE)	23.1	nu star (bias corrected)	22.7
MLE Mean (bias corrected)	16536	MLE Sd (bias corrected)	31043

		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (22.70, α)	12.86	Adjusted Chi Square Value (22.70, β)	12.59
95% Gamma Approximate UCL (use when n>=50)	29178	95% Gamma Adjusted UCL (use when n<50)	29823
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.935	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.1	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.148	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	16547	Mean in Log Scale	8.237
SD in Original Scale	26472	SD in Log Scale	2.054
95% t UCL (assumes normality of ROS data)	23600	95% Percentile Bootstrap UCL	23492
95% BCA Bootstrap UCL	24701	95% Bootstrap t UCL	25805
95% H-UCL (Log ROS)	110592		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	8.162	95% H-UCL (KM -Log)	145879
KM SD (logged)	2.162	95% Critical H Value (KM-Log)	4.019
KM Standard Error of Mean (logged)	0.347		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	16538	Mean in Log Scale	8.092
SD in Original Scale	26478	SD in Log Scale	2.333
95% t UCL (Assumes normality)	23592	95% H-Stat UCL	246011
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
97.5% KM (Chebyshev) UCL	42721		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|gw|xylenes|)			
General Statistics			
Total Number of Observations	43	Number of Distinct Observations	30

Number of Detects	29	Number of Non-Detects	14
Number of Distinct Detects	27	Number of Distinct Non-Detects	3
Minimum Detect	2.3	Minimum Non-Detect	1
Maximum Detect	31000	Maximum Non-Detect	40
Variance Detects	82048615	Percent Non-Detects	32.56%
Mean Detects	4196	SD Detects	9058
Median Detects	170	CV Detects	2.159
Skewness Detects	2.226	Kurtosis Detects	3.53
Mean of Logged Detects	5.764	SD of Logged Detects	2.48
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.514	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.399	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	2830	Standard Error of Mean	1175
SD	7569	95% KM (BCA) UCL	4782
95% KM (t) UCL	4806	95% KM (Percentile Bootstrap) UCL	4927
95% KM (z) UCL	4763	95% KM Bootstrap t UCL	6173
90% KM Chebyshev UCL	6355	95% KM Chebyshev UCL	7951
97.5% KM Chebyshev UCL	10166	99% KM Chebyshev UCL	14519
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.319	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.869	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.251	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.178	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.272	k star (bias corrected MLE)	0.267
Theta hat (MLE)	15435	Theta star (bias corrected MLE)	15732
nu hat (MLE)	15.77	nu star (bias corrected)	15.47
MLE Mean (bias corrected)	4196	MLE Sd (bias corrected)	8125
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.14	nu hat (KM)	12.03
Approximate Chi Square Value (12.03, α)	5.244	Adjusted Chi Square Value (12.03, β)	5.089
95% Gamma Approximate KM-UCL (use when n>=50)	6491	95% Gamma Adjusted KM-UCL (use when n<50)	6689
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			

GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	2830
Maximum	31000	Median	55
SD	7659	CV	2.706
k hat (MLE)	0.14	k star (bias corrected MLE)	0.145
Theta hat (MLE)	20262	Theta star (bias corrected MLE)	19459
nu hat (MLE)	12.01	nu star (bias corrected)	12.51
MLE Mean (bias corrected)	2830	MLE Sd (bias corrected)	7421
		Adjusted Level of Significance (β)	0.0444
Approximate Chi Square Value (12.51, α)	5.563	Adjusted Chi Square Value (12.51, β)	5.402
95% Gamma Approximate UCL (use when n>=50)	6363	95% Gamma Adjusted UCL (use when n<50)	6552
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	2831	Mean in Log Scale	3.871
SD in Original Scale	7659	SD in Log Scale	3.516
95% t UCL (assumes normality of ROS data)	4795	95% Percentile Bootstrap UCL	4798
95% BCA Bootstrap UCL	5269	95% Bootstrap t UCL	6327
95% H-UCL (Log ROS)	584179		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.929	95% H-UCL (KM -Log)	237456
KM SD (logged)	3.329	95% Critical H Value (KM-Log)	5.66
KM Standard Error of Mean (logged)	0.519		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2831	Mean in Log Scale	3.994
SD in Original Scale	7658	SD in Log Scale	3.38
95% t UCL (Assumes normality)	4796	95% H-Stat UCL	327839
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
99% KM (Chebyshev) UCL	14519		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

Total Number of Observations	21	Number of Distinct Observations	16
Number of Detects	11	Number of Non-Detects	10
Number of Distinct Detects	9	Number of Distinct Non-Detects	8
Minimum Detect	0.043	Minimum Non-Detect	0.02
Maximum Detect	1.7	Maximum Non-Detect	6.6
Variance Detects	0.224	Percent Non-Detects	47.62%
Mean Detects	0.291	SD Detects	0.473
Median Detects	0.16	CV Detects	1.625
Skewness Detects	3.178	Kurtosis Detects	10.34
Mean of Logged Detects	-1.817	SD of Logged Detects	0.988

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.489	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.435	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.197	Standard Error of Mean	0.0881
SD	0.364	95% KM (BCA) UCL	0.389
95% KM (t) UCL	0.349	95% KM (Percentile Bootstrap) UCL	0.35
95% KM (z) UCL	0.342	95% KM Bootstrap t UCL	0.687
90% KM Chebyshev UCL	0.461	95% KM Chebyshev UCL	0.581
97.5% KM Chebyshev UCL	0.747	99% KM Chebyshev UCL	1.074

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.139	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.752	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.318	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.262	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.992	k star (bias corrected MLE)	0.782
Theta hat (MLE)	0.293	Theta star (bias corrected MLE)	0.372

nu hat (MLE)	21.82	nu star (bias corrected)	17.21
MLE Mean (bias corrected)	0.291	MLE Sd (bias corrected)	0.329
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.293	nu hat (KM)	12.3
Approximate Chi Square Value (12.30, α)	5.426	Adjusted Chi Square Value (12.30, β)	5.078
95% Gamma Approximate KM-UCL (use when n>=50)	0.446	95% Gamma Adjusted KM-UCL (use when n<50)	0.477
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.165
Maximum	1.7	Median	0.045
SD	0.362	CV	2.192
k hat (MLE)	0.548	k star (bias corrected MLE)	0.501
Theta hat (MLE)	0.301	Theta star (bias corrected MLE)	0.329
nu hat (MLE)	23	nu star (bias corrected)	21.05
MLE Mean (bias corrected)	0.165	MLE Sd (bias corrected)	0.233
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (21.05, α)	11.63	Adjusted Chi Square Value (21.05, β)	11.09
95% Gamma Approximate UCL (use when n>=50)	0.299	95% Gamma Adjusted UCL (use when n<50)	0.313
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.88	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.226	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.181	Mean in Log Scale	-2.404
SD in Original Scale	0.356	SD in Log Scale	1.078
95% t UCL (assumes normality of ROS data)	0.315	95% Percentile Bootstrap UCL	0.334
95% BCA Bootstrap UCL	0.424	95% Bootstrap t UCL	0.683
95% H-UCL (Log ROS)	0.308		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.407	95% H-UCL (KM -Log)	0.374
KM SD (logged)	1.172	95% Critical H Value (KM-Log)	2.807
KM Standard Error of Mean (logged)	0.308		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	

Mean in Original Scale	0.459	Mean in Log Scale	-1.886
SD in Original Scale	0.806	SD in Log Scale	1.578
95% t UCL (Assumes normality)	0.762	95% H-Stat UCL	1.768
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.349	95% KM (% Bootstrap) UCL	0.35
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|offsite|0-3|benzo(b) fluoranthene|)			
General Statistics			
Total Number of Observations	21	Number of Distinct Observations	19
Number of Detects	12	Number of Non-Detects	9
Number of Distinct Detects	11	Number of Distinct Non-Detects	8
Minimum Detect	0.027	Minimum Non-Detect	0.02
Maximum Detect	2	Maximum Non-Detect	6.6
Variance Detects	0.299	Percent Non-Detects	42.86%
Mean Detects	0.277	SD Detects	0.547
Median Detects	0.13	CV Detects	1.975
Skewness Detects	3.375	Kurtosis Detects	11.55
Mean of Logged Detects	-2.064	SD of Logged Detects	1.103
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.439	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.436	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.195	Standard Error of Mean	0.104
SD	0.431	95% KM (BCA) UCL	0.41
95% KM (t) UCL	0.373	95% KM (Percentile Bootstrap) UCL	0.378
95% KM (z) UCL	0.365	95% KM Bootstrap t UCL	1.013
90% KM Chebyshev UCL	0.505	95% KM Chebyshev UCL	0.646
97.5% KM Chebyshev UCL	0.841	99% KM Chebyshev UCL	1.225

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.332	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.765	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.316	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.255	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.766	k star (bias corrected MLE)	0.63
Theta hat (MLE)	0.361	Theta star (bias corrected MLE)	0.439
nu hat (MLE)	18.38	nu star (bias corrected)	15.12
MLE Mean (bias corrected)	0.277	MLE Sd (bias corrected)	0.349
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.204	nu hat (KM)	8.554
Approximate Chi Square Value (8.55, α)	3.06	Adjusted Chi Square Value (8.55, β)	2.812
95% Gamma Approximate KM-UCL (use when n>=50)	0.544	95% Gamma Adjusted KM-UCL (use when n<50)	0.592
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.162
Maximum	2	Median	0.035
SD	0.427	CV	2.631
k hat (MLE)	0.479	k star (bias corrected MLE)	0.442
Theta hat (MLE)	0.339	Theta star (bias corrected MLE)	0.367
nu hat (MLE)	20.11	nu star (bias corrected)	18.57
MLE Mean (bias corrected)	0.162	MLE Sd (bias corrected)	0.244
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (18.57, α)	9.804	Adjusted Chi Square Value (18.57, β)	9.316
95% Gamma Approximate UCL (use when n>=50)	0.308	95% Gamma Adjusted UCL (use when n<50)	0.324
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.177	Mean in Log Scale	-2.632
SD in Original Scale	0.423	SD in Log Scale	1.185
95% t UCL (assumes normality of ROS data)	0.336	95% Percentile Bootstrap UCL	0.356

95% BCA Bootstrap UCL	0.458	95% Bootstrap t UCL	1.008
95% H-UCL (Log ROS)	0.307		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.526	95% H-UCL (KM -Log)	0.31
KM SD (logged)	1.141	95% Critical H Value (KM-Log)	2.761
KM Standard Error of Mean (logged)	0.29		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.454	Mean in Log Scale	-2.043
SD in Original Scale	0.839	SD in Log Scale	1.628
95% t UCL (Assumes normality)	0.77	95% H-Stat UCL	1.758
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
97.5% KM (Chebyshev) UCL	0.841		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|offsite|0-3|indeno(1,2,3-c,d) pyrene|)			
General Statistics			
Total Number of Observations	21	Number of Distinct Observations	16
Number of Detects	9	Number of Non-Detects	12
Number of Distinct Detects	7	Number of Distinct Non-Detects	9
Minimum Detect	0.025	Minimum Non-Detect	0.02
Maximum Detect	1.7	Maximum Non-Detect	6.6
Variance Detects	0.285	Percent Non-Detects	57.14%
Mean Detects	0.281	SD Detects	0.534
Median Detects	0.12	CV Detects	1.9
Skewness Detects	2.96	Kurtosis Detects	8.825
Mean of Logged Detects	-2.085	SD of Logged Detects	1.155
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.469	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.486	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.158	Standard Error of Mean	0.0897
SD	0.367	95% KM (BCA) UCL	0.345
95% KM (t) UCL	0.312	95% KM (Percentile Bootstrap) UCL	0.329
95% KM (z) UCL	0.305	95% KM Bootstrap t UCL	0.819
90% KM Chebyshev UCL	0.427	95% KM Chebyshev UCL	0.549
97.5% KM Chebyshev UCL	0.718	99% KM Chebyshev UCL	1.05
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.341	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.421	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.29	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.736	k star (bias corrected MLE)	0.565
Theta hat (MLE)	0.382	Theta star (bias corrected MLE)	0.498
nu hat (MLE)	13.24	nu star (bias corrected)	10.16
MLE Mean (bias corrected)	0.281	MLE Sd (bias corrected)	0.374
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.185	nu hat (KM)	7.76
Approximate Chi Square Value (7.76, α)	2.597	Adjusted Chi Square Value (7.76, β)	2.373
95% Gamma Approximate KM-UCL (use when n>=50)	0.472	95% Gamma Adjusted KM-UCL (use when n<50)	0.516
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.128
Maximum	1.7	Median	0.01
SD	0.364	CV	2.836
k hat (MLE)	0.463	k star (bias corrected MLE)	0.428
Theta hat (MLE)	0.277	Theta star (bias corrected MLE)	0.3
nu hat (MLE)	19.43	nu star (bias corrected)	17.99
MLE Mean (bias corrected)	0.128	MLE Sd (bias corrected)	0.196
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (17.99, α)	9.381	Adjusted Chi Square Value (17.99, β)	8.905
95% Gamma Approximate UCL (use when n>=50)	0.246	95% Gamma Adjusted UCL (use when n<50)	0.259
Lognormal GOF Test on Detected Observations Only			

Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.324	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.14	Mean in Log Scale	-2.973
SD in Original Scale	0.361	SD in Log Scale	1.223
95% t UCL (assumes normality of ROS data)	0.275	95% Percentile Bootstrap UCL	0.297
95% BCA Bootstrap UCL	0.375	95% Bootstrap t UCL	0.915
95% H-UCL (Log ROS)	0.238		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.779	95% H-UCL (KM -Log)	0.239
KM SD (logged)	1.138	95% Critical H Value (KM-Log)	2.756
KM Standard Error of Mean (logged)	0.305		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.432	Mean in Log Scale	-2.162
SD in Original Scale	0.816	SD in Log Scale	1.689
95% t UCL (Assumes normality)	0.739	95% H-Stat UCL	1.878
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.345		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|offsite|0-3|lead|)			
General Statistics			
Total Number of Observations	22	Number of Distinct Observations	21
		Number of Missing Observations	0
Minimum	38	Mean	1699
Maximum	10000	Median	1200
SD	2283	Std. Error of Mean	486.8

Coefficient of Variation	1.344	Skewness	2.604
Normal GOF Test			
Shapiro Wilk Test Statistic	0.684	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.278	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2536	95% Adjusted-CLT UCL (Chen-1995)	2788
		95% Modified-t UCL (Johnson-1978)	2581
Gamma GOF Test			
A-D Test Statistic	0.391	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.786	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.13	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.193	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.714	k star (bias corrected MLE)	0.647
Theta hat (MLE)	2378	Theta star (bias corrected MLE)	2625
nu hat (MLE)	31.43	nu star (bias corrected)	28.47
MLE Mean (bias corrected)	1699	MLE Sd (bias corrected)	2111
		Approximate Chi Square Value (0.05)	17.3
Adjusted Level of Significance	0.0386	Adjusted Chi Square Value	16.65
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	2796	95% Adjusted Gamma UCL (use when n<50)	2905
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.189	Data Not Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.638	Mean of logged Data	6.594
Maximum of Logged Data	9.21	SD of logged Data	1.513
Assuming Lognormal Distribution			
95% H-UCL	6965	90% Chebyshev (MVUE) UCL	4521

95% Chebyshev (MVUE) UCL	5627	97.5% Chebyshev (MVUE) UCL	7163
99% Chebyshev (MVUE) UCL	10179		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	2499	95% Jackknife UCL	2536
95% Standard Bootstrap UCL	2477	95% Bootstrap-t UCL	3255
95% Hall's Bootstrap UCL	5468	95% Percentile Bootstrap UCL	2524
95% BCA Bootstrap UCL	2899		
90% Chebyshev(Mean, Sd) UCL	3159	95% Chebyshev(Mean, Sd) UCL	3821
97.5% Chebyshev(Mean, Sd) UCL	4739	99% Chebyshev(Mean, Sd) UCL	6542
Suggested UCL to Use			
95% Adjusted Gamma UCL	2905		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Conc (|soil|offsite|0-3|tphd|)			
General Statistics			
Total Number of Observations	22	Number of Distinct Observations	18
Number of Detects	18	Number of Non-Detects	4
Number of Distinct Detects	16	Number of Distinct Non-Detects	2
Minimum Detect	7.8	Minimum Non-Detect	5
Maximum Detect	430	Maximum Non-Detect	10
Variance Detects	10069	Percent Non-Detects	18.18%
Mean Detects	93.66	SD Detects	100.3
Median Detects	60.5	CV Detects	1.071
Skewness Detects	2.437	Kurtosis Detects	7.3
Mean of Logged Detects	4.061	SD of Logged Detects	1.07
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.744	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.209	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	77.57	Standard Error of Mean	20.75

SD	94.58	95% KM (BCA) UCL	114.4
95% KM (t) UCL	113.3	95% KM (Percentile Bootstrap) UCL	114.4
95% KM (z) UCL	111.7	95% KM Bootstrap t UCL	134.4
90% KM Chebyshev UCL	139.8	95% KM Chebyshev UCL	168
97.5% KM Chebyshev UCL	207.1	99% KM Chebyshev UCL	284
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.232	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.763	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.103	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.209	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.183	k star (bias corrected MLE)	1.023
Theta hat (MLE)	79.2	Theta star (bias corrected MLE)	91.59
nu hat (MLE)	42.57	nu star (bias corrected)	36.81
MLE Mean (bias corrected)	93.66	MLE Sd (bias corrected)	92.62
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.673	nu hat (KM)	29.6
Approximate Chi Square Value (29.60, α)	18.18	Adjusted Chi Square Value (29.60, β)	17.51
95% Gamma Approximate KM-UCL (use when n>=50)	126.3	95% Gamma Adjusted KM-UCL (use when n<50)	131.1
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	76.63
Maximum	430	Median	48.5
SD	97.56	CV	1.273
k hat (MLE)	0.361	k star (bias corrected MLE)	0.342
Theta hat (MLE)	212.3	Theta star (bias corrected MLE)	224.1
nu hat (MLE)	15.88	nu star (bias corrected)	15.05
MLE Mean (bias corrected)	76.63	MLE Sd (bias corrected)	131
		Adjusted Level of Significance (β)	0.0386
Approximate Chi Square Value (15.05, α)	7.294	Adjusted Chi Square Value (15.05, β)	6.893
95% Gamma Approximate UCL (use when n>=50)	158.1	95% Gamma Adjusted UCL (use when n<50)	167.3
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.133	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.209	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	77.62	Mean in Log Scale	3.621
SD in Original Scale	96.77	SD in Log Scale	1.363
95% t UCL (assumes normality of ROS data)	113.1	95% Percentile Bootstrap UCL	113.3
95% BCA Bootstrap UCL	126.1	95% Bootstrap t UCL	139.3
95% H-UCL (Log ROS)	239.5		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.62	95% H-UCL (KM -Log)	218.7
KM SD (logged)	1.327	95% Critical H Value (KM-Log)	3.066
KM Standard Error of Mean (logged)	0.291		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	77.2	Mean in Log Scale	3.52
SD in Original Scale	97.1	SD in Log Scale	1.523
95% t UCL (Assumes normality)	112.8	95% H-Stat UCL	331.5
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	113.3	95% KM (Percentile Bootstrap) UCL	114.4
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|onsite|0-3|benzo(a) pyrene|)			
General Statistics			
Total Number of Observations	19	Number of Distinct Observations	11
Number of Detects	2	Number of Non-Detects	17
Number of Distinct Detects	2	Number of Distinct Non-Detects	9
Minimum Detect	0.0868	Minimum Non-Detect	0.033
Maximum Detect	0.1	Maximum Non-Detect	0.45
Variance Detects	8.7120E-5	Percent Non-Detects	89.47%
Mean Detects	0.0934	SD Detects	0.00933
Median Detects	0.0934	CV Detects	0.0999
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-2.373	SD of Logged Detects	0.1

Warning: Data set has only 2 Detected Values.			
This is not enough to compute meaningful or reliable statistics and estimates.			
Normal GOF Test on Detects Only			
Not Enough Data to Perform GOF Test			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0431	Standard Error of Mean	0.00926
SD	0.0227	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0591	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0583	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0708	95% KM Chebyshev UCL	0.0834
97.5% KM Chebyshev UCL	0.101	99% KM Chebyshev UCL	0.135
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	199.9	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.6716E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	799.7	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	3.609	nu hat (KM)	137.1
		Adjusted Level of Significance (β)	0.0369
Approximate Chi Square Value (137.13, α)	111.1	Adjusted Chi Square Value (137.13, β)	109
95% Gamma Approximate KM-UCL (use when n>=50)	0.0532	95% Gamma Adjusted KM-UCL (use when n<50)	0.0542
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0568	Mean in Log Scale	-2.899
SD in Original Scale	0.0155	SD in Log Scale	0.247
95% t UCL (assumes normality of ROS data)	0.0629	95% Percentile Bootstrap UCL	0.0624
95% BCA Bootstrap UCL	0.0641	95% Bootstrap t UCL	0.0661
95% H-UCL (Log ROS)	0.0631		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.062	Mean in Log Scale	-3.151
SD in Original Scale	0.0569	SD in Log Scale	0.883

95% t UCL (Assumes normality)	0.0846	95% H-Stat UCL	0.105

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0591	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (|soil|onsite|0-3|benzo(b) fluoranthene|)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	11
Number of Detects	2	Number of Non-Detects	17
Number of Distinct Detects	2	Number of Distinct Non-Detects	9
Minimum Detect	0.0858	Minimum Non-Detect	0.033
Maximum Detect	0.09	Maximum Non-Detect	0.45
Variance Detects	8.8200E-6	Percent Non-Detects	89.47%
Mean Detects	0.0879	SD Detects	0.00297
Median Detects	0.0879	CV Detects	0.0338
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-2.432	SD of Logged Detects	0.0338

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0422	Standard Error of Mean	0.00836
SD	0.0205	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0566	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0559	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0672	95% KM Chebyshev UCL	0.0786
97.5% KM Chebyshev UCL	0.0944	99% KM Chebyshev UCL	0.125

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1752	k star (bias corrected MLE)	N/A
Theta hat (MLE)	5.0180E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	7007	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	4.237	nu hat (KM)	161
		Adjusted Level of Significance (β)	0.0369
Approximate Chi Square Value (160.99, α)	132.7	Adjusted Chi Square Value (160.99, β)	130.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.0512	95% Gamma Adjusted KM-UCL (use when n<50)	0.052
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0738	Mean in Log Scale	-2.609
SD in Original Scale	0.00635	SD in Log Scale	0.0835
95% t UCL (assumes normality of ROS data)	0.0764	95% Percentile Bootstrap UCL	0.0761
95% BCA Bootstrap UCL	0.0766	95% Bootstrap t UCL	0.0769
95% H-UCL (Log ROS)	N/A		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0614	Mean in Log Scale	-3.157
SD in Original Scale	0.0566	SD in Log Scale	0.877
95% t UCL (Assumes normality)	0.0839	95% H-Stat UCL	0.104
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0566	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (|soil|onsite|0-3|lead|)			

General Statistics			
Total Number of Observations	23	Number of Distinct Observations	23
		Number of Missing Observations	0
Minimum	6.4	Mean	214.8
Maximum	1100	Median	55.9
SD	316.8	Std. Error of Mean	66.06
Coefficient of Variation	1.475	Skewness	1.911
Normal GOF Test			
Shapiro Wilk Test Statistic	0.696	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.255	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.185	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	328.3	95% Adjusted-CLT UCL (Chen-1995)	351.6
		95% Modified-t UCL (Johnson-1978)	332.6
Gamma GOF Test			
A-D Test Statistic	0.88	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.804	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.199	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.192	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.509	k star (bias corrected MLE)	0.472
Theta hat (MLE)	422.1	Theta star (bias corrected MLE)	455.6
nu hat (MLE)	23.41	nu star (bias corrected)	21.69
MLE Mean (bias corrected)	214.8	MLE Sd (bias corrected)	312.8
		Approximate Chi Square Value (0.05)	12.11
Adjusted Level of Significance	0.0389	Adjusted Chi Square Value	11.59
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	384.9	95% Adjusted Gamma UCL (use when n<50)	402.1
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.198	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.185	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	1.856	Mean of logged Data	4.125
Maximum of Logged Data	7.003	SD of logged Data	1.777
Assuming Lognormal Distribution			
95% H-UCL	1214	90% Chebyshev (MVUE) UCL	618.1
95% Chebyshev (MVUE) UCL	781.2	97.5% Chebyshev (MVUE) UCL	1008
99% Chebyshev (MVUE) UCL	1452		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	323.5	95% Jackknife UCL	328.3
95% Standard Bootstrap UCL	319.7	95% Bootstrap-t UCL	407.6
95% Hall's Bootstrap UCL	360.9	95% Percentile Bootstrap UCL	329.8
95% BCA Bootstrap UCL	348.8		
90% Chebyshev(Mean, Sd) UCL	413	95% Chebyshev(Mean, Sd) UCL	502.8
97.5% Chebyshev(Mean, Sd) UCL	627.4	99% Chebyshev(Mean, Sd) UCL	872.1
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	502.8		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

Conc (|soil|onsite|0-3|tphd|)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	18
Number of Detects	17	Number of Non-Detects	2
Number of Distinct Detects	16	Number of Distinct Non-Detects	2
Minimum Detect	2.55	Minimum Non-Detect	2.4
Maximum Detect	89	Maximum Non-Detect	2.5
Variance Detects	609.9	Percent Non-Detects	10.53%
Mean Detects	22.2	SD Detects	24.7
Median Detects	8.52	CV Detects	1.113
Skewness Detects	1.488	Kurtosis Detects	1.865
Mean of Logged Detects	2.49	SD of Logged Detects	1.17
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.786	**Shapiro Wilk GOF Test**	

5% Shapiro Wilk Critical Value	0.892	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.28	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	20.12	Standard Error of Mean	5.549
SD	23.46	95% KM (BCA) UCL	29.23
95% KM (t) UCL	29.74	95% KM (Percentile Bootstrap) UCL	29.69
95% KM (z) UCL	29.24	95% KM Bootstrap t UCL	33.15
90% KM Chebyshev UCL	36.76	95% KM Chebyshev UCL	44.3
97.5% KM Chebyshev UCL	54.77	99% KM Chebyshev UCL	75.32
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.708	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.768	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.2	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.952	k star (bias corrected MLE)	0.823
Theta hat (MLE)	23.32	Theta star (bias corrected MLE)	26.97
nu hat (MLE)	32.36	nu star (bias corrected)	27.98
MLE Mean (bias corrected)	22.2	MLE Sd (bias corrected)	24.47
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.735	nu hat (KM)	27.93
Approximate Chi Square Value (27.93, α)	16.87	Adjusted Chi Square Value (27.93, β)	16.12
95% Gamma Approximate KM-UCL (use when n>=50)	33.3	95% Gamma Adjusted KM-UCL (use when n<50)	34.85
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	19.86
Maximum	89	Median	7.36
SD	24.31	CV	1.224
k hat (MLE)	0.509	k star (bias corrected MLE)	0.463
Theta hat (MLE)	39.06	Theta star (bias corrected MLE)	42.87
nu hat (MLE)	19.33	nu star (bias corrected)	17.61
MLE Mean (bias corrected)	19.86	MLE Sd (bias corrected)	29.18
		Adjusted Level of Significance (β)	0.0369
Approximate Chi Square Value (17.61, α)	9.108	Adjusted Chi Square Value (17.61, β)	8.576

95% Gamma Approximate UCL (use when n>=50)	38.4	95% Gamma Adjusted UCL (use when n<50)	40.78
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.146	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	19.95	Mean in Log Scale	2.203
SD in Original Scale	24.24	SD in Log Scale	1.398
95% t UCL (assumes normality of ROS data)	29.59	95% Percentile Bootstrap UCL	29.43
95% BCA Bootstrap UCL	31.23	95% Bootstrap t UCL	33.43
95% H-UCL (Log ROS)	69.57		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	2.32	95% H-UCL (KM -Log)	45.69
KM SD (logged)	1.183	95% Critical H Value (KM-Log)	2.88
KM Standard Error of Mean (logged)	0.28		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	19.99	Mean in Log Scale	2.249
SD in Original Scale	24.21	SD in Log Scale	1.318
95% t UCL (Assumes normality)	29.62	95% H-Stat UCL	59.02
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	44.3	95% GROS Adjusted Gamma UCL	40.78
95% Adjusted Gamma KM-UCL	34.85		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			