U.S. Army Corps of Engineers
Alaska District

NORTHEAST CAPE
RE-EVALUATION OF HUMAN HEALTH RISK
AT SITES 21 AND 28

NORTHEAST CAPE FUDS
ST. LAWRENCE ISLAND, ALASKA

Formerly Used Defense Site No. F10AK0969-03

FINAL
JUNE 2016

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
AT	averaging time
COC	chemical of concern
COPC	chemical of potential concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSM	conceptual site model
DD	Decision Document
DRO	diesel-range organics
ED	exposure duration
EF	exposure frequency
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
FRMD	FUDS Records Management Database
FUDS	Formerly Used Defense Site
GAF	gastrointestinal absorption factor
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
IRIS	Integrated Risk Information System
kg/mg	kilograms per milligram
mg/kg	milligrams per kilogram
MOC	Main Housing and Operations Complex
NE Cape	Northeast Cape
OSWER	Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEF	particulate emission factor
RAGS	*Risk Assessment Guidance for Superfund*
RAPM	Risk Assessment Procedures Manual
RfD	reference dose
RPF	relative potency factor
RRO	residual-range organics
SF	slope factor
UCL	upper confidence limit
UCL_{95}	95-percent UCL
USACE	U.S. Army Corps of Engineers
VF	volatilization factor

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1.0 INTRODUCTION

This re-evaluation of human health risk at Northeast Cape (NE Cape) Formerly Used Defense Site (FUDS) Site 21 (wastewater treatment plant) and Site 28 (drainage basin) located on Saint Lawrence Island, Alaska, was performed following remedial actions at these sites and includes a re-evaluation of arsenic background concentrations using data from samples collected at Site 21. The remedies selected in the Decision Document (DD) for these sites were implemented from 2010 through 2014. This risk assessment updates the results presented in the 2004 human health risk assessment (HHRA) by considering concentrations of contaminants remaining in soil after the selected remedies were implemented at each site, as well as incorporates new chemicals of potential concern (COPCs) encountered during remedy implementation at Site 28. New cleanup levels are proposed based on the risk calculations using the conceptual site model (CSM) and exposure settings developed in the 2004 HHRA.

1.1 REPORT ORGANIZATION

This report is composed of the following sections:

- **Section 1.0** summarizes the purpose of the updated HHRA, describes the history of Sites 21 and 28, and summarizes the physical characteristics of the site.
- **Section 2.0** identifies methods used for evaluating COPC data, data usability, essential nutrients, and the derivation of exposure point concentrations (EPCs).
- **Section 3.0** summarizes potential exposure pathways to contaminants at the site in relation to human receptors and presents the quantification of chemical intakes and supporting formulas.
- **Section 4.0** provides a toxicity assessment that evaluates carcinogenic and non-carcinogenic effects and explains the derivation of dermal toxicity values and toxicological values.
- **Section 5.0** summarizes the risk characterization using the exposure and toxicity assessments and presents the potential for adverse effects related to the site.
- **Section 6.0** summarizes an uncertainty analysis of the HHRA process.
- **Section 7.0** summarizes the conclusions of this updated HHRA.
- **Appendix A** provides exposure point concentration tables and input/output files calculated using the U.S. Environmental Protection Agency (EPA) statistical software package, ProUCL Version 5.0.

- **Appendix B** provides calculated cancer risks and non-cancer hazards for reasonable maximum exposure.
- **Appendix C** provides the cleanup level calculations based on specific target cancer risks and target hazard indices.

1.2 SITE DESCRIPTION

1.2.1 Location and Setting

Saint Lawrence Island is located in the northern Bering Sea off the western coast of Alaska. NE Cape lies approximately 135 air miles southwest of Nome, Alaska. The former installation, which originally encompassed 4,800 acres, falls between Kitnagak Bay to the northeast, Kangighsak Point to the northwest, and the Kinipaghulghat Mountains to the south. The site is located at 63°20′N and 168°59′W, in Township 25 South, Range 54 West, Kateel River Meridian. The site is not connected to the surrounding communities by road and is only accessible via air, water, or all-terrain vehicle (U.S. Army Corps of Engineers [USACE] 2009).

The climate, topography, geology, hydrology, large mammals, small mammals, birds, and fish are described in the 2004 HHRA (USACE 2004) and DD (USACE 2009) and have not changed for the purposes of this updated risk calculation. The total annual precipitation is 10 to 16 inches (USACE 2004, 2009). Site 21 is located west of the perimeter road and includes the wastewater treatment plant for the Main Housing and Operations complex (MOC). The site is located in tundra and groundwater is generally found 3 to 4 feet below ground surface. Site 28 is a drainage basin that lies immediately north of the MOC and flows north into the Suqitughneq River (USACE 2009).

1.2.2 Community Profile and Land Use

The nearest community to the project site is the Village of Savoonga on Saint Lawrence Island, approximately 60 miles northwest of the site, with a population of 671 people, according to the 2010 U.S. Census (U.S. Census Bureau 2015). There are no permanent residents at the NE Cape site, but there is a small subsistence hunting and fishing camp in the

area that is occasionally inhabited in the summer by residents of Savoonga and Gambell. Snowmachine travel during the winter months provides residents of Gambell and Savoonga relatively easy access to the site. The NE Cape site property is currently owned jointly by the two local native corporations, Sivuqaq, Inc. in Gambell and Kukulget, Inc. in Savoonga. The island is accessible by boat, regularly scheduled airlines to and from Gambell and Savoonga, and chartered air flights out of Nome. There is no regularly scheduled commercial access to the project site.

1.2.3 Subsistence Activities

Savoonga is a traditional Siberian Yup'ik village, with a subsistence lifestyle. Whale, seal, walrus, and reindeer compose 80 percent of islanders' diets. The economy is largely based upon subsistence hunting of walrus, seal, fish, and whale, with some cash income. Berries and edible plants are also harvested. Savoonga residents fish for halibut in the vicinity of NE Cape for subsistence and commercial purposes.

1.3 HISTORY

Saint Lawrence Island was established as a reindeer reserve by Executive Order on 7 January 1903. The U.S. Air Force constructed an Aircraft Control and Warning Station at NE Cape in 1950 and 1951 and activated the facility in 1952 (USACE 2009). In 1954, a White Alice Communications System was added. The original site was designed to support 212 personnel. Throughout its existence, the NE Cape facility has been a surveillance station, providing radar coverage for the Alaskan Air Command and, later, for the North American Air Defense Command as part of an Alaska-wide system constructed to reduce potential vulnerability to bomber attacks across the polar regions. The White Alice Communications System area remained in operation with minimal military staff until 1972.

Demolition of buildings and most other structures has been completed under USACE direction (USACE 2009).

1.3.1 Previous Studies and Actions

Environmental investigations and cleanup activities at NE Cape began in the mid-1980s, with the goal of locating and identifying areas of contamination and gathering enough information to develop a cleanup plan. Preliminary assessments began in 1985 and remedial investigations began in 1994 and continued through 2004, as described in the DD (USACE 2009). Up to 34 separate sites were investigated. An HHRA and ecological risk assessment was completed in 2004 (USACE 2004), and a feasibility study was completed in 2007 (USACE 2007). In 2009, USACE produced a DD (USACE 2009) that presented the selected remedies for NE Cape in accordance with Comprehensive Environmental Response, Compensation, and Liability Act requirements, as amended by the Superfund Amendments and Reauthorization Act and the National Oil and Hazardous Substances Pollution Contingency Plan (EPA 1990). Remedial actions were determined for each site of concern at NE Cape (USACE 2009). Only remedies and activities at Sites 21 and 28 are described in this document.

For Site 21, the DD selected the remedy of excavation and removal of polychlorinated biphenyl (PCB)- and arsenic-contaminated soil. For Site 28, the DD selected the remedy of excavation and removal of petroleum, metals, and PCB-contaminated sediment, including removal of near-surface sediments from the narrow channel upgradient of the Suqitughneq River. Additionally, the Site 28 remedy included construction of sedimentation pond or other appropriate controls (USACE 2009).

Removal actions for these sites began in 2010 and continued through 2013 for Site 28 and 2014 for Site 21. Details are provided in the site-specific sections below.

1.4 SITE 21 WASTEWATER TREATMENT PLANT

1.4.1 Site 21 Description and History

Site 21, west of the MOC Perimeter Road, was the location of the wastewater treatment plant for the MOC. The infrastructure consisted of a concrete settling tank with attached piping, enclosed in a wooden utilidor that discharged to the tundra approximately 450 feet to the west (USACE 2009). The infrastructure was removed in 2003 and soil confirmation samples were collected after the removal of the piping and utilidor from locations along the piping run and at the inlet and outfall lines.

PCBs, arsenic, and chromium were identified as chemicals of concern (COCs) at this site; however, chromium in soils exists in the trivalent state and the concentrations do not pose a potential risk to residents (USACE 2009). In 1994, arsenic was detected in groundwater at concentrations exceeding the cleanup level but was subsequently eliminated as a COC in groundwater. USACE concluded that the arsenic resulted from the presence of sediments within the groundwater sample. PCB contamination was excavated and removed in 2010, so the primary remaining COC at the site consisted of arsenic in soil located near the outfall of the former discharge pipe. The source of the arsenic in the area is unknown. The maximum arsenic concentration at the time of the DD was 170 milligrams per kilogram (mg/kg) in one location with all other locations ranging from 2.8 to 39 mg/kg (USACE 2009).

1.4.2 Site 21 Removal Activities

Arsenic-contaminated soil was removed in 2010, 2011, 2012, 2013, and 2014 resulting in the combined removal of approximately 547 tons of soil (USACE 2015). In 2013, 20 soil borings were installed to delineate the vertical and horizontal extent of contamination and to guide excavation. Arsenic concentrations found in soil borings and excavations during remedial actions ranged from 1.1 to 340 mg/kg. By the end of 2014, all known locations exceeding 17 mg/kg had been excavated, including four borings from 2003 where arsenic concentrations had ranged from 18.4 to 35.2 mg/kg (USACE 2015). A majority of the western half of the site was excavated to a depth below the groundwater surface.

1.4.3 Site 21 Arsenic Excavation Results

At the conclusion of the remedial activities, arsenic contamination ranging from 2 to 17 mg/kg remained at nine sample locations identified during 2012, 12 sample locations from 2013, and 31 sample locations from 2014. The results used as input for risk calculations are presented in Appendix A. In the case of duplicate results, the greater of the primary or duplicate result was retained to calculate the EPC for the risk assessment. Data were evaluated using ProUCL Version 5.0.

1.4.4 Site 21 Arsenic Background

In 2014, soil samples were collected from three depths in each of 49 soil borings in the vicinity of Site 21 and analyzed for arsenic. The results are presented in Appendix A. For any duplicates present in the data set, the smaller of the primary or duplicate result was retained for statistical analysis. Data were evaluated using ProUCL Version 5.0 for outliers and calculation of background concentrations. ProUCL did not suggest a background concentration but indicated that the data appear to be lognormally distributed. Under this distribution, a 95-percent upper tolerance limit with 95-percent coverage is estimated to be 11.82 mg/kg (Appendix A).

1.5 SITE 28 DRAINAGE BASIN

1.5.1 Site 28 Description and History

The Site 28 drainage basin lies north of the MOC and flows north into the Suqitughneq River. The site has been affected by fuel releases, as well as surface water runoff and subsurface water seeps from the MOC, which drain into this tundra/wetland area (USACE 2009). The primary COCs in sediments identified in the DD were diesel-range organics (DRO), residual-range organics (RRO), polycyclic aromatic hydrocarbons (PAHs), PCBs, chromium, lead, and zinc. During implementation of the remedy, additional contaminants were encountered, or the concentrations exceeded those included in the 2004 HHRA for this site (USACE 2004).

Sediment and soil sampling in 2011 revealed contaminants that exceeded Alaska Department of Environmental Conservation (ADEC) and site-specific cleanup levels, including DRO, RRO, toluene, ethylbenzene, total xylenes, PAHs, PCBs, arsenic, cadmium, chromium, lead, and selenium. The highest concentrations of contaminants were located proximal to the edge of the MOC (USACE 2013a).

In 2012, sediment mapping was conducted in two phases. First, streams and ponds in the drainage basin were visually and manually inspected to define the horizontal boundaries of the sediment areas. Second, probing was conducted to determine the thickness of sediment and the composition of the underlying material in each sediment area. Sediment was defined as all loose material (mineral and/or organic) except for that with actively growing vegetation or part of a vegetative mat. Approximately 400 cubic yards of sediment were mapped within the Site 28 drainage basin in 2012.

Sediment samples were collected from the mapped sediment areas to delineate the extent and magnitude of contamination at the site. Analytical results from the sampling effort indicated that fuel, PCBs, and metal contamination was present within the drainage basin, and the highest contaminant concentrations were generally found adjacent to the MOC pad.

1.5.2 Site 28 Removal Actions

A total of 265 bank cubic yards (defined as the volume of earth in its natural state before excavation) of sediment were removed from the drainage channel in Site 28. The first 21 bank cubic yards of contaminated sediment was removed at two locations near the MOC pad using the excavator. The remaining volume was removed by suction dredge and by hand. The depth of sediment removal did not exceed 2 feet in any removal area.

1.5.3 Site 28 Results

Forty-one primary and five duplicate confirmation soil samples were collected after sediment removal activities in 2013 (USACE 2014). The soil confirmation samples were collected by using either a hand auger or a gloved hand and submitted for DRO, RRO, benzene, toluene,

ethylbenzene, xylenes, PAHs, PCBs, and metals (arsenic, barium, cadmium, chromium, lead, mercury, nickel, selenium, silver, vanadium, and zinc) analysis and for silica gel cleanup and total organic carbon, as described in ADEC Technical Memorandum 06-001. Confirmation samples were collected at a rate of one sample for every 30 feet of channel and one sample for every 400 square feet of sediment in ponded areas where sediment was removed. A minimum of one sample was collected from each pond that contained sediment.

Contaminants that exceeded cleanup levels include DRO, RRO, arsenic, chromium, 1-methlynaphthalene, and 2-methylnaphthalene. Site 28 soil confirmation samples are presented in Appendix A.

Arsenic concentrations in the confirmation soil samples ranged from 4.6 to 88 mg/kg. A total of 20 samples exceeded the site-specific cleanup level of 11 mg/kg for arsenic, with the highest concentration detected in sample 13NC28SS035.

Chromium concentrations in the confirmation soil samples ranged from 4.2 to 32 mg/kg. Five samples exceeded the 25 mg/kg cleanup level for chromium level stated in the Alaska Administrative Code Title 18, Chapter 75.341 Table B1 (migration to groundwater) (ADEC 2015a). Chromium concentrations did not exceed the ambient level of 48 mg/kg for the site (USACE 2009) and are described in the NE Cape DD (USACE 2009) as existing in the trivalent state, thus not posing a risk to residents.

A total of 20 samples exceeded cleanup levels for 1-methylnaphthalene and 2-methylnaphthalene. Concentrations of 1-methylnaphthalene ranged from nondetect to 78 mg/kg, with the highest concentration found in sample 13NC28SS036. Concentrations of 2-methylnaphthalene ranged from nondetect to 86 mg/kg, with the highest concentration contained in sample 13NC28SS023.

Concentrations of DRO in the samples ranged from 42 to 85,000 mg/kg. In total, 22 samples contained DRO in concentrations that exceeded the site-specific cleanup level of 9,200 mg/kg, with the highest concentration found in sample 13NC28SS013. Silica gel

cleanup was applied to DRO extracts. Although DRO results were lower following silica gel cleanup, only two samples were below the site-specific cleanup level following treatment (13NC28SS007 and 13NC28SS016). In sample 13NC28SS007, silica gel extraction reduced the DRO concentration from 11,000 to 8,000 mg/kg; sample 13NC28SS016 was reduced from 12,000 to 9,100 mg/kg.

Concentrations of RRO in the confirmation samples ranged from 500 to 26,000 mg/kg. A total of 16 samples exceeded the site-specific cleanup level of 9,200 mg/kg for RRO, with the highest concentration found in sample 13NC28SS023. Following silica gel cleanup, RRO concentrations in 75 percent of the soil samples that exceeded the cleanup level were reduced to levels below the cleanup level. Concentrations of RRO were reduced by an average of 53 percent in all samples following silica gel extraction.

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2.0 IDENTIFICATION AND EVALUATION OF COPCs

This section describes the methods for evaluating the data, identifying COPCs, and deriving the EPCs for Site 21 and Site 28 in this HHRA.

2.1 DATA EVALUATION

Analytical data for this HHRA were selected based on the representativeness and quality of the data. Analytical results for Site 21 include data from confirmation and boring samples collected in 2012, 2013, and 2014 remaining in place following removal actions at the site. Confirmation samples were collected from areas of concern at Site 28 following completion of remedial actions as described above.

2.1.1 Evaluation of Data Quality

Only validated data was used for this HHRA. Analytical results and associated quality control samples were reviewed and data found to be acceptable with the limitations discussed in the data quality assessments and the ADEC checklists are included (USACE 2013b, 2014, 2015).

2.1.2 Data Usability

All available analytical data of acceptable quality were included in this HHRA; data qualified J were used, while data qualified R (rejected) were not used. Data with other qualifiers were evaluated on a case-by-case basis. Generally, when confidence was reasonably high that the chemical was detected, but the actual concentration is somewhat in question, the data were used. For most analytes, identification at concentrations above levels in the blanks (considering the 5×, 10× rule) was considered presumptive evidence of their presence. In general, there were no data for which the identity of the detected analyte was unclear, and no data were excluded from further consideration based on low frequencies of detection.

2.2 PROCESS OF IDENTIFICATION OF COPCs

COPCs are chemicals identified as site-related and potentially capable of contributing significantly to risk. COPCs were identified based on the ADEC Risk Assessment Procedures Manual (RAPM) (ADEC 2015b) using all analytical data of acceptable quality. For field duplicates, the greater value of the primary or duplicate was used. For soil borings associated with the Site 21 excavation, only the sample location with the highest concentration of the remaining COPC (arsenic) was used. Arsenic was the only COPC analyzed at Site 21. At Site 28, all analytes with at least one detected concentration were carried forward to quantitative evaluation.

2.3 DERIVATION OF EPCs

The EPC is a conservative estimate of the average concentration of a COPC, statistically calculated from the analytical results of all samples for a particular environmental medium to which a receptor may be exposed over the duration of the exposure. The EPCs of COPCs in soil are statistically derived values, based on the analytical data described above.

Exposure to an environmental medium is generally assumed to be random, and the EPC should be the arithmetic average encountered over the exposure duration (EPA 1989a). Therefore, the population mean concentration, if known, would be the ideal value selected as the EPC. The sample mean is an obvious estimate of the population mean. In accordance with EPA guidance, both the mean and the upper confidence limit (UCL) on the mean were estimated for each COPC in soils. EPA (1989a) has recommended the inclusion of the 95-percent UCL (UCL_{95}) on the sample mean for reasonable maximum exposure evaluation.

In general, unusually high values are included in the calculation of the UCL_{95} because high values seldom appear as statistical outliers in environmental data. Inclusion of outliers increases the overall conservatism of the risk estimate. The EPA statistical software package ProUCL Version 5.0 was used to compute estimated mean and UCL_{95} concentrations. The input and output files for Sites 21 and 28 are provided in Appendix A. The recommended output from ProUCL was used as the UCL on the mean for each COPC in soils. In the case

where a recommended distribution was not selected, the maximum concentration was used to represent the UCL.

The RAPM (ADEC 2015b) requires that relative potency factors (RPFs) presented in EPA's approach (EPA 2010) must be used to convert concentrations of carcinogenic polycyclic aromatic hydrocarbons (cPAHs) to an equivalent concentration of benzo(a)pyrene when assessing the cancer risks posed by these substances from oral exposures. These RPFs are based on the potency of each compound relative to that of benzo(a)pyrene.

Chemical RPFs that were applied to cPAHs are as follows:

Anthanthrene	RPF 0.4
Anthracene	RPF 0
Benzo[a]anthracene	RPF 0.2
Benzo[a]pyrene	RPF 1
Benzo[b]fluoranthene	RPF 0.8
Benzo[g,h,i]perylene	RPF 0.009
Benzo[j]fluoranthene	RPF 0.3
Benzo[k]fluoranthene	RPF 0.03
Chrysene	RPF 0.1
Dibenzo(a,h)anthracene	RPF 10
Fluoranthene	RPF 0.08
Indeno[1,2,3-cd]pyrene	RPF 0.07
Phenanthrene	RPF 0
Pyrene	RPF 0

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3.0 HUMAN HEALTH RISK ASSESSMENT

The HHRA approach was developed in accordance with the RAPM (ADEC 2015b) and includes exposure assessment, toxicity assessment, and risk characterization. This process is consistent with the original 2004 HHRA. Where additional clarification or guidance was required, the following ADEC and EPA source documents were consulted:

- EPA 2015 (February). *Risk Assessment Procedures Manual*. Division of Spill Prevention and Response Contaminated Sites Program.
- EPA 1989a. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A).* Interim Final. Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89/002.
- EPA 1991a. *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors*. Interim Final. Office of Solid Waste and Emergency Response (OSWER) Directive: 9285.6-03.
- EPA 1991b (December). *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual Part B – Development of Risk-Based Preliminary Remediation Goals*. Interim. Office of Emergency and Remedial Response, Washington, D.C., EPA/540/R-92/003.
- EPA 1992. *Dermal Exposure Assessment: Principles and Applications*. Interim Report, Office of Research and Development. Washington, D.C. EPA/600/891/011B. Including Supplemental Guidance dated 18 August 1992.
- EPA 2004 (July). *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E - Supplemental Guidance for Dermal Risk Assessment)*, Final. Office of Superfund Remediation and Technology Innovation. Washington, D.C., EPA/540/R-99/005.
- EPA 2009 (January). *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual* (Part F, Supplemental Guidance for Inhalation Risk Assessment). Final. Office of Superfund Remediation and Technology Innovation, Washington, D.C., EPA/540/R-070/002.

3.1 EXPOSURE ASSESSMENT

The exposure assessment is conducted to identify the persons or receptors that are or may be exposed to the site, the pathways through which they are potentially exposed, and the magnitude of these potential exposures. To quantify the magnitude of exposure, required information must include the COPC concentrations in various exposure media to which receptors are exposed (EPCs) and receptor-specific exposure or intake factors that determine

the amount of chemical that enters the body (either orally, absorbed through the skin, or inhaled). The exposure assessment includes several steps:

- Evaluating the exposure setting, which includes a description of the land use and the potentially exposed human populations
- Developing the CSM to identify the source of contamination, the contamination transport and release mechanisms, the exposure media, the exposure routes, and the potentially exposed populations
- Calculating EPCs for each COPC for each of the complete exposure pathways identified in the CSM
- Identifying the exposure models and parameters with which to calculate the exposure intakes
- Calculating exposure intakes

The exposure setting and CSM were developed in the original 2004 HHRA and are not changed for the purpose of this update. New EPCs were calculated (Appendix A) and the exposure models are presented in this document to account for any updates in methodology since the 2004 HHRA. Intake exposures were calculated using the newest data set (Appendix B).

3.1.1 Exposure Setting

The NE Cape facility is accessible by boat, aircraft, or all-terrain vehicles. Island residents harvest food from areas in and around the installation during the summer months, and others occasionally visit the area in both summer and winter (USACE 2004). Future land uses are likely to include subsistence fishing, hunting, and gathering. Additional hunting/fishing camps may be built and a permanent residential scenario is possible at some sites. However, as noted in the 2004 HHRA, the residential scenario is not likely for Site 28 due to being a lowland area with seasonal flooding.

3.1.2 Conceptual Site Model

The CSM developed and presented in the 2004 HHRA incorporated preliminary CSM information and additional information, including: (1) results of interviews/surveys completed by St. Lawrence Island residents in June 2001; (2) field observations and data collected during July and August 2001 investigations; (3) results of a 20 September 2001 teleconference among representatives of the USACE (Alaska District), ADEC, U.S. Army Center for Health Promotion and Preventive Medicine, and MWH Global, Inc.; and (4) results of an expanded survey completed by St. Lawrence Island residents in January 2003.

Receptors of Concern

Receptors identified in the CSM include current and future seasonal residents and future hypothetical adult and child residents:

- **Seasonal Residents.** Island residents harvest food from areas in and around the NE Cape facility during the summer months (mid-June through mid-September), and others occasionally visit the area both in summer and winter. No people currently reside permanently at, or in the vicinity of, the NE Cape facility; however, two groups of individuals visit during the year to engage in subsistence fishing, hunting, and gathering. Food harvests consist of fish, animals, and plants.
- **Permanent Residents.** Future land uses are likely to include subsistence fishing, hunting, and gathering. Interviews with island residents suggest that additional fishing/hunting camps may be built, and a permanent residential scenario is possible at some sites. The residential scenario is not considered likely for Site 28 because it is a lowland area subject to seasonal flooding.

Contaminants and Media of Potential Concern

At Site 21, the only remaining COPC is arsenic in soil. At Site 28, surface soil COPCs include DRO, RRO, PAHs, PCBs, and metals.

3.2 QUANTIFICATION OF CHEMICAL INTAKES

This section describes the models used to quantify doses or intakes of the COPCs for each exposure pathway. Exposure parameters for the different pathways for soil match those used in the 2004 HHRA (Table 3-1). Doses and intake values were also considered as specified by

the RAPM (ADEC 2015b). Because the adult and child future residents were evaluated separately, no age adjustments were made to the equations. This differs from the 2004 HHRA where adult and child intake values were added together and then multiplied by slope factors (SFs) to arrive at an overall risk.

Intakes were calculated for both cancer and non-cancer evaluations. Therefore, the averaging time (AT) variable shown in the following equations is replaced with AT_n for non-cancer calculations (365×exposure duration [ED]), and with AT_c (25,550 days) for the cancer calculations. Intake values were based on EPCs and the equations discussed below for the respective exposure pathways.

3.2.1 Incidental Ingestion of COPCs in Soil

The ingested dose of COPCs in soil was estimated from the following equation, as it was in the 2004 HHRA:

$$I_{so} = \frac{(C_{so})(FI_{so})(IR_{so})(EF)(ED)(CF_2)}{(BW)(AT)} \qquad \textbf{Eq. 3.1}$$

Where:

I_{so} = ingested dose of COPC in soil (mg/kg-day, calculated)
C_{so} = concentration of COPC in soil (mg/kg)
FI_{so} = fraction of exposure attributed to site soil (unitless)
IR_{so} = ingestion rate of soil (mg/day)
EF = exposure frequency (days/year)
ED = exposure duration (years)
CF_2 = conversion factor (1×10^{-6} kilograms per milligram [kg/mg])
BW = body weight (kg)
AT = averaging time (days)

Table 3-1
Values Used for Daily Intake Calculations – Reasonable Maximum Exposure (Soil)

Exposure Parameter	Units	Current/Future Seasonal Resident		Future Permanent Resident	
		Adult	Child	Adult	Child
General					
Soil/Sediment/Dust Concentration - C_S	mg/kg	SS	SS	SS	SS
Body Weight - BW [a]	kg	70	15	70	15
Averaging time (AT) - Carcinogens [a]	years	70	70	70	70
Averaging Time (AT) - Non-carcinogens [a]	years	24	6	24	6
Ingestion of Soil/Sediment/Dust					
Soil Ingestion Rate - IR	mg/day	100	200	100	200
Exposure Frequency - EF [b,c]	days/year	90	90	270	270
Exposure Duration - ED [a]	year	24	6	24	6
Dermal Contact with Soil/Sediment/Dust					
Dermal Surface Area - SA [d]	cm^2/event	3,300	2,800	3,300	2,800
Skin Adherence Factor - AF [d]	mg/cm^2	0.2	0.2	0.2	0.2
Skin Absorption Factor - ABS	unitless	CS	CS	CS	CS
Exposure Frequency -EF [b,c]	days/year	90	90	270	270
Exposure Duration - ED [a]	year	24	6	24	6
Inhalation of Particulates from Dust					
Inhalation Rate - InhR [a]	m^3/day	20	10	20	10
Particulate Emission Factor - PEF [e]	m^3/kg	1.3×10^9	1.3×10^9	1.3×10^9	1.3×10^9
Exposure Frequency -EF [b,c]	days/year	90	90	270	270
Exposure Duration - ED [a]	year	24	6	24	6

Notes:
cm = centimeter
cm^2 = square centimeter
CS = chemical-specific
gm = gram(s)
kg = kilograms
m^3 = cubic meter
mg = milligrams
SS = site-specific
[a] Source: EPA, 1991
[b] An EF of 90 days per year for current/future seasonal residents is based on interviews with locals who indicate that they use the installation for subsistence fishing/hunting/gathering for approximately three months of the year.
[c] An EF of 270 days per year for future permanent residents was obtained from ADEC's Cleanup Levels Guidance (ADEC 2008b) and ADEC RAPM (ADEC 2015b).
[d] Source: EPA 2001
[e] Source: EPA 1998

3.2.2 Dermal Contact with COPCs in Soil

Unlike the methodologies for estimating inhaled or ingested doses of the COPCs, which quantify the dose presented to the barrier membrane (the pulmonary or gastrointestinal

mucosa), dermal dose is estimated as the dose that crosses the skin and is systemically absorbed.

The absorbed dose of the COPCs is estimated from the following equation (EPA 1992b):

$$DAD = \frac{(DA)(SA)(EF)(ED)}{(BW)(AT)} \quad \textbf{Eq. 3.2}$$

Where:

DAD	=	average dermal absorbed dose of the COPCs (mg/kg-day, calculated)
DA	=	dose absorbed per unit body surface area per day (mg/cm^2-day)
SA	=	surface area of the skin exposed (cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)

Dermal uptake of constituents from soil assumes that absorption is a function of the fraction of a dermally applied dose that is absorbed, as calculated from the following equation (EPA 1992b):

$$DA = (C)(FI)(CF_2)(AF)(ABS) \quad \textbf{Eq. 3.3}$$

Where:

DA	=	dose absorbed per unit body surface area per day (mg/cm^2-day, calculated)
C	=	concentration of COPC in soil (mg/kg)
FI	=	fraction of exposure attributed to site soil (unitless)
CF_2	=	conversion factor (1×10^{-6} kg/mg)
AF	=	soil-to-skin adherence factor (mg/cm^2-day)
ABS	=	absorption fraction (unitless, chemical-specific), will be provided for each COPC

3.2.3 Inhalation of Fugitive Dust and Volatiles from Soil

Inhalation of contaminants occurs when soil particles become airborne and when organic compounds volatilize from the soil. This pathway was not evaluated as a significant exposure

route in the 2004 HHRA due to the annual snow cover and frequent precipitation. The equation is included in this HHRA, but the overall effect remains rather insignificant for the two evaluated locations. The basic equation for the evaluation of exposure to soil via the inhalation pathway is:

$$Intake = \frac{C_s \times IR \times EF \times ED \times \left(\frac{1}{PEF} + \frac{1}{VF}\right)}{BW \times AT} \qquad \textbf{Eq. 3.4}$$

Where:

C_s	=	contaminant concentration in soil (mg/kg)
IR	=	inhalation rate (m^3/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
PEF	=	particulate emission factor (kg/m^3)
VF	=	volatilization factor (kg/m^3)
BW	=	body weight (kg)
AT	=	averaging time (days)
carcinogens	=	70 (years)×365 (days/year)
non-carcinogens	=	ED (years)×365 (days/year)

Particulate Emission Factor

The particulate emission factor (PEF) was used to calculate exposure to contaminated soils due to inhalation of fugitive dust. A PEF was calculated using default parameters (EPA 1991, 1992c) in the following equation (EPA 1996):

$$PEF = Q/C \times \frac{3{,}600}{0.36 \times (1-V) \times (U_m \times U_t)^3 \times F(x)} \qquad \textbf{Eq. 3.5}$$

Where:

PEF	=	particulate emission factor (m^3/kg)
Q/C	=	inverse of the mean concentration at the center of a 1 acre square source (g/m^2-s per kg/m^3)
V	=	fraction of vegetative cover (unitless)
U_m	=	mean annual wind speed (m/s)
U_t	=	equivalent threshold value of wind speed at 7 m/s
F(x)	=	function dependent on U_m/U_t

Soil-To-Air Volatilization Factor

The soil-to-air volatilization factor (VF) was used to calculate exposure to contaminated soils due to inhalation of volatilized organic compounds. VFs were quantified only for organic compounds with a molecular weight of less than 200 grams/mole and a Henry's Law constant greater than 1E-5 atm-m^3/mole (EPA 1991a). Chemical-specific soil-to-air VFs were calculated using the following equation (EPA 1996):

$$VF = \frac{Q/C \times (3.14 \times D_A \times T)^{1/2} \times 10^{-4}}{2 \times \rho_b \times D_A} \qquad \textbf{Eq. 3.6}$$

Where:

$$D_A = \frac{(\Theta_a{}^{10/3} D_i H' + \Theta_w{}^{10/3} D_w) n^2}{\rho_b K_d + \Theta_w + \Theta_a H'} \qquad \textbf{Eq. 3.7}$$

Where:

VF	=	volatilization factor (m^3/kg)
Q/C	=	inverse of the mean concentration at the center of a 1-acre square source (g/m^2-s per kg/m^3
D_A	=	apparent diffusivity (cm^2/s)
T	=	exposure time interval (s)
ρ_b	=	dry soil bulk density (g/cm^3)
θ_a	=	air filled soil porosity (l_{air}/L_{soil})
n	=	total soil porosity (L_{pore}/L_{soil})
θ_w	=	water filled soil porosity (l_{water}/L_{soil})
ρ_s	=	soil particle density (g/cm^3)
D_i	=	diffusivity in air (cm^2/s)
H'	=	dimensionless Henry's law constant
D_w	=	diffusivity in water (cm^2/s)
K_d	=	soil water partition coefficient (cm^3/g) = $K_{oc} \times f_{oc}$
K_{oc}	=	soil organic carbon partition coefficient (cm^3/g)
f_{oc}	=	fraction organic carbon in soil (g/g)

4.0 TOXICITY ASSESSMENT

Toxicity is defined as the ability of a chemical to induce adverse effects in biological systems. The purpose of the toxicity assessment is two-fold:

- Identify the cancer and non-cancer effects that may arise from exposure of humans to the COPC (hazard assessment).
- Provide an estimate of the quantitative relationship between the magnitude and duration of exposure and the probability or severity of adverse effects (dose-response assessment).

The latter is accomplished by the use of cancer and non-cancer toxicity values, as described in Sections 4.1 through 4.5.

4.1 EVALUATION OF CARCINOGENICITY

A few chemicals are known, and many more are suspected, to be human carcinogens. The carcinogenic SFs and the accompanying weight-of-evidence classifications are used to evaluate potential human carcinogenic risks associated with exposures.

EPA derives SF and unit risk values for carcinogens. SFs generally represent an upper bound on the average risk in a population or the risk for a randomly selected individual but not the risk for a highly susceptible individual or group. The SF defines quantitatively the relationship between dose and response as the plausible upper bound estimate of the probability of a response (e.g., development of cancer) per unit intake of a potential carcinogen over a lifetime.

The SF is expressed in terms of risk per unit concentration of the chemical (milligrams [mg]) per unit body weight (kilograms [kg]) per unit time (day) or $(mg/kg/day)^{-1}$.

4.2 EVALUATION OF NON-CARCINOGENIC EFFECTS

Many chemicals, whether associated with carcinogenicity or not, are associated with non-carcinogenic effects. The reference dose (RfD) is an exposure route- and duration-specific toxicity value, expressed as mg/kg-day, which is considered to be the dose at

which adverse effects are not expected to occur in humans, and includes uncertainty of an order of magnitude or greater. Mathematically, it is estimated as the ratio of the threshold dose to the uncertainty factor. Exposure doses that exceed the RfD could potentially cause adverse health effects.

4.3 DERMAL TOXICITY VALUES

Dermal RfDs and SFs were derived from the corresponding oral values, provided there is no evidence to suggest that dermal exposure induces exposure route-specific effects that are not appropriately modeled by oral exposure data. In the derivation of a dermal RfD, the oral RfD was multiplied by the gastrointestinal absorption factor (GAF), expressed as a decimal fraction. The resulting dermal RfD, therefore, is based on absorbed dose. The RfD based on absorbed dose is the appropriate value with which to compare a dermal dose, because dermal doses are expressed as absorbed rather than exposure doses. The dermal SF was derived by dividing the oral SF by the GAF. The oral SF is divided, rather than multiplied, by the GAF because the SF is expressed as a reciprocal dose. Exhibit 4-1 in the *Risk Assessment Guidance for Superfund* (RAGS) Part E also provides a comprehensive list of chemicals for which adjustment of the oral toxicity criteria based on limited GAF is appropriate (EPA 2004).

GAFs, used to derive dermal RfD values and SFs from the corresponding oral toxicity values, were obtained from the following sources:

- Oral absorption efficiency data compiled by the National Center for Environmental Assessment for the Superfund Health Risk Technical Support Center of EPA
- Federal agency reviews of the empirical data, such as the Agency for Toxic Substances and Disease Registry Toxicological Profiles and various EPA criteria documents
- Other published reviews of the empirical data
- The primary literature

Exhibit 4-1 in RAGS Part E (EPA 2004) was reviewed for a comprehensive list of chemicals for which adjustment of the oral toxicity criteria based on limited gastrointestinal absorption is appropriate. The suitability of the GAF increases when similarities are present in the oral

pharmacokinetic study from which the GAF is derived and the key toxicity study from which the oral toxicity value is derived, such as:

- The same strain, sex, age, and species of the test animals were used
- The same chemical form (e.g., the same salt or complex of an inorganic element or organic compound) was used
- The same mode of administration (e.g., diet, drinking water, or gavage vehicle) was used
- Similar dose rates were used

4.4 TARGET ORGAN TOXICITY

As a matter of science policy, EPA assumes dose and effect to be additive for non-carcinogenic effects (EPA 1989a). This assumption provides the justification for adding the hazard quotients (HQs) or hazard indexes (HIs) in the risk characterization for non-cancer effects resulting from exposure to multiple chemicals, pathways, or media. However, the EPA RAGS (EPA 1989a) acknowledges that adding all HQ or HI values may overestimate the hazard, because the assumption of additivity is probably appropriate only for those chemicals that exert their toxicity by the same mechanism.

Mechanisms of toxicity data sufficient for predicting additivity with a high level of confidence are available for very few chemicals. In the absence of such data, the EPA RAGS (EPA 1989a) assumes that chemicals that act on the same target organ may do so by the same mechanism of toxicity; that is, the target organ serves as a surrogate for mechanism of toxicity. When total HI for all media for a receptor exceeds 1 due to the contributions of several chemicals, it is appropriate to segregate the chemicals by route of exposure and mechanism of toxicity (e.g., target organ), and estimate separate HI values for each target organ. In this assessment, only soil and dust were evaluated and this situation did not arise.

4.5 SOURCES OF TOXICITY INFORMATION USED IN THE RISK ASSESSMENT

Toxicity values were selected for use in the HHRA based on the EPA OSWER Directive 9285.7-53 (EPA 2003) which prescribes the following hierarchy:

- **Tier 1 values**: Listed in the EPA Integrated Risk Information System (IRIS) database. Some of these values may have been updated since the 2004 HHRA and are updated accordingly in this re-evaluation of risk.
- **Tier 2 values**: EPA's provisional peer-reviewed toxicity values. The provisional peer-reviewed toxicity values are developed by the Office of Research and Development, the National Center for Environmental Assessment, and the Superfund Health Risk Technical Support Center on a chemical-specific basis when requested by the Superfund program.
- **Tier 3 values**: Other toxicity values from additional EPA and non-EPA sources of toxicity information. As stated in the EPA OSWER Directive (EPA 2003), "priority should be given to those sources of information that are the most current, the basis for which is transparent and publicly available, and which have been peer-reviewed." Examples of Tier 3 values recommended by EPA (EPA 2005b) are as follows:
  - EPA Health Effects Assessment Summary Tables (EPA 1997)
  - California Environmental Protection Agency (2005) Office of Environmental Health Hazard Assessment Toxicity Criteria Database
  - California Environmental Protection Agency toxicity values (peer-reviewed, U.S. Center for Disease Control – Agency for Toxic Substances and Disease Registry Toxicological Profiles
  - EPA criteria documents

4.5.1 Special Chemicals: Petroleum Hydrocarbons

For Site 28, samples were analyzed for indicator contaminants associated with petroleum (e.g., toluene, benzene, PAHs) as well as DRO and RRO. In accordance with ADEC's *Cumulative Risk Guidance* (ADEC 2008a), indicator contaminants associated with petroleum were evaluated individually and included within the cumulative risk results.

5.0 RISK CHARACTERIZATION

Risk characterization is the combination of the results of the exposure assessment and toxicity assessment to yield a quantitative expression of risk. Quantitative estimates are developed for individual chemicals, exposure pathways, and exposure media for each receptor. The risk characterization is used to guide risk management decisions.

Generally, the risk characterization follows the methodology prescribed by EPA (1989a) and is the same as the risk characterization used in the 2004 HHRA, modified by more recent information and guidance. The methods are designed to be health-protective and tend to overestimate rather than underestimate risk. The risk results are generally conservative because risk characterization involves multiplication of the conservatisms built into the estimation of EPC, the exposure (intake) estimates, and the toxicity dose-response assessments. Risk characterization is limited to those site-related chemicals selected as COPCs.

Up to this point, the term “risk” has been used generically to mean the potential for the occurrence of adverse effects, either cancer or non-cancer, to arise from exposure to chemicals. From this point forward, however, “risk” is used to describe the likelihood or probability of the occurrence of cancer. “Non-cancer hazard” is used to describe the potential for the occurrence of non-cancer effects.

5.1 CANCER RISK

The risk from exposure to potential chemical carcinogens is estimated as the probability of an individual developing cancer over a lifetime, and is called the incremental lifetime cancer risk (ILCR). In the low-dose range, which would be expected for most environmental exposures, cancer risk is estimated from the following linear equation (EPA 1989a):

$$ILCR = (CDI)(SF) \qquad \textbf{Eq. 5.1}$$

Where:

$ILCR$	=	incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated
CDI	=	chronic daily intake, averaged over 70 years (mg/kg-day)
SF	=	cancer slope factor (risk per mg/kg-day).

The use of Equation 5.1 assumes that chemical carcinogenesis does not exhibit a threshold and that the dose-response relationship is linear in the low-dose range. Because this equation could generate theoretical cancer risks greater than 1 for high-dose levels, it is considered to be inaccurate at gauging cancer risks greater than 1×10^{-2}. In these cases, cancer risk may be estimated by the one-hit model (EPA 1989a):

$$ILCR = 1 - e^{[(CDI)(SF)]} \qquad \textbf{Eq. 5.2}$$

Where:

$ILCR$	=	incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated
$e^{[(CDI)(SF)]}$	=	the exponential of the risk calculated using Equation 5.1

As a matter of policy, the EPA considers the carcinogenic risk of simultaneous exposure to low doses of different carcinogenic chemicals to be additive, regardless of the chemicals' mechanisms of toxicity or sites (organs of the body) of action (EPA 1986). For example, cancer risk arising from exposure to more than one chemical in a specific medium and pathway is estimated from the following equation:

$$ILCR_p = ILCR_{chem1} + ILCR_{chem2} + ...ILCR_i \quad \textbf{Eq. 5.3}$$

Where:

$ILCR_p$ = incremental lifetime cancer risk for more than one chemical in a specific medium and pathway, calculated

$ILCR_{chemi}$ = individual chemical cancer risk for that pathway and medium

Cancer risk for a given receptor across chemicals and across media is summed in the same manner. For risk management purposes, ADEC has established the ILCR goal of 1×10^{-5}. However, ILCR estimates between 1×10^{-6} and 1×10^{-4} may be considered acceptable consistent with the Code of Federal Regulations, Title 40, Part 300.430. ILCR estimates above 1×10^{-4} are considered to be unacceptable.

5.2 NON-CANCER HAZARDS

The non-cancer hazards associated with chemicals are evaluated by comparing an exposure level or intake with an RfD. The HQ, defined as the ratio of intake to RfD, is estimated using the following equation (EPA 1989b):

$$HQ = \frac{I}{RfD} \quad \textbf{Eq. 5.4}$$

Where:

HQ = hazard quotient (unitless, calculated)

I = intake of chemical averaged over subchronic or chronic exposure period (mg/kg-day)

RfD = reference dose (mg/kg-day)

Chemical non-cancer hazards were evaluated using chronic RfD values. This approach is different from the probabilistic approach used to evaluate cancer risks. An HQ of 0.01 does

not imply a 1 in 100 chance of an adverse effect, but indicates that the estimated intake is 100 times lower than the RfD. An HQ of 1 indicates that the estimated intake equals the RfD. If the HQ is greater than 1, there may be concern for potential adverse health effects. In the case of simultaneous exposure of a receptor to multiple chemicals, or to a given chemical by multiple pathways, an HI is calculated as the sum of the HQs as follows:

$$HI = HQ_1 + HQ_2 + HQ_i \qquad \textbf{Eq. 5.5}$$

Where:

HI = hazard index (unitless, calculated)

HQ_i = hazard quotient for the ith chemical, or for the *i*th pathway

An HI may be calculated across all exposure pathways for a given chemical, across all chemicals for a given exposure pathway, across all chemicals and exposure pathways for a given exposure medium, or across all chemicals, pathways and media to yield the total HI for a given receptor.

HQ or HI values below or equal to the threshold value of 1 are interpreted to mean that adverse non-cancer effects are unlikely. HQ or HI values greater than 1 are interpreted to mean that there is a likelihood of adverse non-cancer effects.

Calculating a total HI as the sum of HQ values is based on the assumption that the potential for non-cancer effects is additive. EPA, however, acknowledges that the assumption of additivity is probably appropriate only for chemicals that induce adverse effects by the same mechanism (EPA 1989b). Therefore, if the total HI for a receptor exceeds 1, individual HI values may be calculated for each target organ as follows:

$$Total\ HI_a = HI_{p1-a} + HI_{p2-a} + ...HI_{pi-a} \qquad \textbf{Eq. 5.6}$$

Where:

$Total\ HI_a$ = total hazard index for target organ "*a*" (unitless, c*alculated)*

HI_{pi-a} = hazard index for target organ "*a*" via pathway "*i*"

5.3 RISK CHARACTERIZATION RESULTS AND DISCUSSION

ILCR and HQ estimates for each receptor, medium, and COPC, including sums across exposure routes for each COPC, are compiled in tables in Appendix B. Considerable uncertainty is associated with ILCR, HQ, and HI estimates; therefore, EPA recommends that they be rounded to one significant figure for presentation in an HHRA (EPA 1989a). For example, an HI of 1.49×10^{0} is rounded to 1 and interpreted to mean that the HI does not exceed the threshold level of 1 and that occurrence of adverse non-cancer effects is unlikely. An HI of 1.49×10^{1} is rounded to 15.

COCs are defined as the chemicals that contribute significantly to an ILCR exceeding ADEC's risk goal of 1×10^{-5} or an HI exceeding 1. For this discussion, similar to the 2004 HHRA, an individual chemical is considered to contribute significantly to the cancer risk estimate if its ILCR summed across all exposure routes exceeds 1×10^{-6}. Similarly, an individual chemical is considered to contribute significantly to the non-cancer hazard if its HI summed across all exposure routes exceeds 0.1. When total HI summed across chemicals and/or media exceeds the threshold limit of 1, EPA suggests that consideration be given to possible benefit of segregating HI values by target organ (EPA 1989a).

Total HI and ILCR estimates are summarized in Tables 5-1 through 5-4 and are discussed below; detailed results are provided in Appendix B. The uncertainties associated with the HI and ILCR estimates are discussed in Section 6.0.

Current/Future Seasonal Resident – Site 21

The current and future seasonal resident was evaluated for exposure to surface soils via the ingestion, dermal contact, and inhalation of fugitive dust. Results are summarized in Table 5-1.

Table 5-1
Summary of Non-Cancer Hazards and Cancer Risks for Current/Future Seasonal Resident at Site 21

Type	Hazard Index	ILCR
Onsite Surface Soil – Adult		
Ingestion	0.008	1×10^{-6}
Dermal	0.002	3×10^{-7}
Inhalation of Fugitive Dust/Volatiles	9.6×10^{-14}	2×10^{-18}
Surface Soil Total	0.01	2×10^{-6}
Onsite Surface Soil – Child		
Ingestion	0.08	3×10^{-6}
Dermal	0.007	3×10^{-7}
Inhalation of Fugitive Dust/Volatiles	9.6×10^{-14}	5×10^{-19}
Surface Soil Total	0.08	3×10^{-6}

Total HI estimates for the current and future adult and child seasonal resident for arsenic in soil are 0.01 and 0.08, respectively (Appendix B).

The total ILCR estimates for the current and future adult and child seasonal resident exposure to arsenic in soil are 2×10^{-6} and 3×10^{-6}, respectively.

Future Resident – Site 21

The hypothetical future resident was evaluated for exposure to surface soil via the ingestion, dermal contact, and inhalation of fugitive dust. Results are provided in Table 5-2.

Table 5-2
Summary of Non-Cancer Hazards and Cancer Risks for Hypothetical Future Resident at Site 21

Type	Hazard Index	ILCR
Onsite Surface Soil – Adult		
Ingestion	0.03	4×10^{-6}
Dermal	0.005	8×10^{-7}
Inhalation of Fugitive Dust/Volatiles	0.0004	1×10^{-8}
Surface Soil Total	0.03	5×10^{-6}
Onsite Surface Soil – Child		
Ingestion	0.2	9×10^{-6}
Dermal	0.02	8×10^{-7}
Inhalation of Fugitive Dust/Volatiles	0.0004	2×10^{-9}
Surface Soil Total	0.3	1×10^{-5}

Total HI estimates for the future adult and child resident for exposure to arsenic in soil are 0.03 and 0.3, respectively (Appendix B).

The total ILCR estimate for the future hypothetical adult and child resident exposure to arsenic in soil are 5×10^{-6} and 1×10^{-5}, respectively.

Current/Future Seasonal Resident – Site 28

The current and future seasonal resident was evaluated for exposure to surface soils via the ingestion, dermal contact, inhalation of fugitive dust and volatile organic vapors. Results are summarized in Table 5-3.

Table 5-3
Summary of Non-Cancer Hazards and Cancer Risks for Current/Future Seasonal Resident at Site 28

Type	Hazard Index	ILCR
Onsite Surface Soil – Adult		
Ingestion	0.04	6×10^{-6}
Dermal	0.009	1×10^{-6}
Inhalation of Fugitive Dust/Volatiles	0.000000000002	7×10^{-16}
Surface Soil Total	0.05	7×10^{-6}
Onsite Surface Soil – Child		
Ingestion	0.4	1×10^{-5}
Dermal	0.04	1×10^{-6}
Inhalation of Fugitive Dust/Volatiles	0.000000000002	2×10^{-16}
Surface Soil Total	0.4	2×10^{-5}

Total HI estimate for the current and future adult and child seasonal resident for soil are 0.05 and 0.4, respectively (Appendix B). Arsenic contributed to 90 percent of each HI.

The total ILCR estimates for the current and future adult and child seasonal resident are 7×10^{-6} and 2×10^{-5}, respectively. The COPC driving the elevated ILCR was the ingestion and dermal contact of arsenic for the child (ILCR = 1×10^{-5}).

Future Resident – Site 28

Although site residency is not considered feasible due to the hydrology of the Site 28 area, a future resident scenario is presented as a basis for comparison. The hypothetical future adult and child resident was evaluated for exposure to surface soil via the ingestion, dermal contact, and inhalation of fugitive dust and volatile organic vapors. Results are provided in Table 5-4.

Table 5-4
Summary of Non-Cancer Hazards and Cancer Risks for Hypothetical Future Resident

Type	Hazard Index	ILCR
Onsite Surface Soil – Adult		
Ingestion	0.1	2×10^{-5}
Dermal	0.03	4×10^{-6}
Inhalation of Fugitive Dust/Volatiles	0.09	3×10^{-6}
Surface Soil Total	0.3	3×10^{-5}
Onsite Surface Soil – Child		
Ingestion	1	4×10^{-5}
Dermal	0.1	4×10^{-6}
Inhalation of Fugitive Dust/Volatiles	0.09	8×10^{-7}
Surface Soil Total	1	5×10^{-5}

Total HI estimates for the future adult and child resident for soil are 0.3 and 1, respectively (Appendix B). The COPC driving the elevated HI was arsenic.

The total ILCR estimate for the future hypothetical adult and child resident are 3×10^{-5} and 5×10^{-5}, respectively. The COPC driving the elevated ILCR was the ingestion and dermal contact of arsenic (2×10^{-5} and 4×10^{-5}, respectively).

5.4 DERIVATION OF CLEANUP LEVELS

Cleanup levels were derived for arsenic for future child seasonal and child and adult permanent residents at Site 28 because their cancer risks exceeded the ADEC risk goal of 1×10^{-5} although none of the scenarios exceeded the Comprehensive Environmental Response,

Compensation, and Liability Act risk goal of $1x10^{-4}$. Cleanup levels were calculated using the following equation:

$$CL = \frac{TR \times EPC}{ILCR} \qquad \textbf{Eq. 5.7}$$

Where:

TR	=	target cancer risk or target hazard quotient
EPC	=	exposure point concentration
ILCR	=	total incremental lifetime cancer risk

Cleanup levels were calculated for target cancer risks of 1×10^{-6} to 1×10^{-4} and target hazard indices of 0.1 and 1 (Appendix C). The cleanup levels consider the cumulative risk from all COPCs at Site 28. Cleanup levels for adult residential exposure to arsenic at Site 28 are 1.2, 12, and 120 mg/kg. Cleanup levels for child residential exposure to arsenic are 0.66, 6.6, and 66 mg/kg. These permanent residential scenarios are provided only as a basis of comparison because seasonal flooding in the drainage basin creates site conditions that make permanent residence unlikely. Cleanup levels for the more likely child seasonal residential exposure to arsenic are 2.1, 21, and 210 mg/kg. The calculated hazards and risk for adult seasonal residents do not exceed the ADEC target risk goal. The calculated hazards and risks for all scenarios do not exceed a cumulative risk of 1×10^{-4} nor a hazard index of 1.

6.0 UNCERTAINTY ANALYSIS

This section evaluates the uncertainties inherent in the HHRA process. Uncertainty is a factor in each step of the data evaluation and exposure and toxicity assessments presented in the preceding sections. Uncertainties associated with early stages of the HHRA become magnified when they are concatenated with other uncertainties in the latter stages. It is not possible to eliminate all uncertainty, and sometimes, not even to reduce it. However, a recognition of the uncertainties is fundamental to the understanding and reasonable use of the HHRA results.

Generally, risk assessments carry two types of uncertainty. Measurement uncertainty refers to the usual variance that accompanies scientific measurements such as instrument uncertainty (accuracy and precision) associated with contaminant concentrations. The results of the risk assessment incorporate the accumulated variances of the individual measured values. A different kind of uncertainty stems from data gaps. Often the data gap is significant, such as imprecision regarding the number of days that a hunter might visit the site or the absence of information on the effects of human exposure to a chemical (EPA 1992c).

6.1 SAMPLING AND ANALYTICAL LIMITATIONS

It is not possible to completely characterize the nature and extent of contamination on any site. Uncertainties arise from limits on the number of locations that can be sampled. Samples of surface soil at Sites 21 and 28, however, were densely investigated, making it unlikely that contamination could exist onsite at substantially higher concentrations. The sample locations are densely distributed around the investigation and removal sites and over-represent the exposure of an individual person. In addition, many of the locations are permanently underwater, reducing the actual soil exposure pathways.

6.2 SELECTION AND QUANTIFICATION OF COPCs

Uncertainty associated with the processes used to identify COPCs and estimate EPCs arises from the following:

- At Site 21, samples were only analyzed for arsenic; therefore, additional COPCs may be present. However, Site 21 has been extensively investigated and several removal actions have been performed at the site making it less likely that additional COPCs are present at unacceptable concentrations. At Site 28, all detected analytes were selected as COPCs; therefore, there is little uncertainty associated with the selection of COPCs.
- Estimated EPCs are uncertain. Computed UCL_{95} values are only estimates of the actual UCLs associated with each data set. Examples of factors affecting the uncertainty of these estimates include the number of samples, proportion of nondetects, conformance with an assumed mathematical distribution, imprecision of laboratory data, elevated detection limits (from dilutions, matrix interference, etc.), and statistical methodology.
- Per EPA guidance (EPA 1989a), the UCL_{95} was used for the EPC for soils. Therefore, the exposure assessment is likely to underestimate the EPCs in 5 percent of the cases and overestimate exposures in 95 percent of cases, imparting an overall conservative bias to the HHRA.
- Laboratory analytical techniques have a degree of uncertainty associated with them. These uncertainties are documented by using data qualifiers to reflect the degree of certainty of measurement. For example, some data were estimated (e.g., J-qualified) or might have had recovery issues.

6.3 SELECTION OF HYPOTHETICAL RECEPTORS AND POTENTIAL EXPOSURE PATHWAYS

The exposure scenarios previously described address plausible receptors for the current and projected future site uses. Although the specific uses to which the site may be put are very certain, the general residential receptor is comprehensive and fairly standard. However, many of the sample locations in Site 21 are below the groundwater level, limiting actual human exposure under the described scenarios, and any form of residential occupation of Site 28 is highly uncertain since the sample locations are from a drainage system that contains water during most, if not all, of the year.

The seasonal residential scenario is based on site-specific information. Even the seasonal exposure at Site 28 is overestimated because results are assumed to be soil but are actually

collected from the bottom of water bodies where unconsolidated sediment was removed. The receptor scenarios selected for evaluation include the most intensely exposed for each general site-use category; therefore, uncertainty regarding the specific uses has no meaningful effect on interpretation of the HHRA.

6.4 QUANTIFICATION OF INTAKES

Ingestion rates, inhalation rates, EDs, and EFs were based on upper bound values, even though it is likely that serial multiplication of conservative variable values leads to gross overestimation of COPC intakes (Cogliano 1998).

6.5 TOXICITY ASSESSMENT

Considerable uncertainty is associated with the qualitative (hazard assessment) and quantitative (dose-response) evaluations of a toxicity assessment. Hazard assessment of carcinogenicity is evaluated as a weight-of-evidence determination (EPA 1986). Positive animal cancer test data suggest that humans also contain tissue(s) that may manifest a carcinogenic response; however, the animal data cannot necessarily be used to predict the target tissue in humans. In the hazard assessment of non-cancer effects, positive animal data suggest the nature of the effects (e.g., the target tissues and type of effects) anticipated in humans (EPA 1989b). Sources of uncertainty in the dose-response evaluation for cancer (e.g., computation of an SF or unit risk) and non-cancer effects (e.g., computation of an RfD) include the following:

- First, there is uncertainty regarding interspecies (animal-to-human) extrapolation which, in the absence of quantitative pharmacokinetic, dosimetric, or mechanistic data, is usually based on consideration of interspecies differences in basal metabolic rate.
- Second, there is uncertainty regarding intraspecies or individual variation. Most toxicity experiments are performed with animals that are very similar in age and genotype, so that intragroup biological variation is minimal, but the human population of concern may reflect wide heterogeneity including unusual sensitivity to the COPC. Even toxicity data from human occupational exposure reflect a bias because only those individuals sufficiently healthy to attend work regularly and those not unusually sensitive to the COPC are likely to be occupationally exposed.

- Third, uncertainty arises due to expansion from short-term to lifetime exposure, such as the construction worker and child future resident. Additional uncertainty arises from the potential for children to be more sensitive than adults.
- Finally, the quality of the key study from which the quantitative estimate is derived and the database contributes to uncertainty. For cancer studies, the uncertainty associated with some quality factors (e.g., study group size) is expressed within the 95 percent upper bound of the SF. For non-cancer effects, additional uncertainty factors may be applied in the derivation of the RfD to reflect poor quality of the key study or gaps in the database.

Another source of uncertainty regarding quantitative risk estimation for carcinogenicity is the method by which data from high doses in animal studies are extrapolated to the dose range expected for environmentally exposed humans. The linearized multistage model, which is used in most quantitative estimates of human cancer risk from animal data (PAHs and PCBs), is based on a non-threshold assumption of carcinogenesis. An impressive body of evidence, however, suggests that epigenetic carcinogens, as well as many genotoxic carcinogens, have a threshold below which they are non-carcinogenic (Gold et al. 1992). Therefore, the use of the linearized multistage model is ultraconservative for chemicals that exhibit a threshold for carcinogenicity.

A further source of uncertainty for non-cancer effects arises from use of an effect level in the estimation of an RfD or inhalation reference concentration because this estimation is predicated on the assumption of a threshold below which adverse effects are not expected. Therefore, an additional uncertainty factor is usually applied to estimate a no-effect level. Additional uncertainty arises from estimating RfD values for chronic exposure from less-than-chronic data. Unless empirical data indicate that effects do not worsen with increasing duration of exposure, an additional uncertainty factor is applied to the no-effect level in the less-than-chronic study.

In summary, the EPA methodology for both cancer and non-cancer toxicity evaluation is intentionally designed to be protective. However, the extent to which toxicity values may overestimate toxic potency is not clear, and it is possible that the toxicity values for some compounds may not be adequately protective.

6.6 **RISK CHARACTERIZATION**

Risk characterization is the process of quantifying cancer risk due to potential carcinogen exposures and of quantifying the hazard posed by potential exposures to non-carcinogenic toxicants. Cancer risk is assumed to be additive for all carcinogens. Non-cancer risk is assumed to be additive for chemicals with similar sites of toxicological action. In the event that any combination of these chemicals results in synergistic effects, risk might be underestimated. Conversely, the assumption of additivity would overestimate risk if a combination of these chemicals acted antagonistically or had no combined toxic effect at all.

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7.0 CONCLUSIONS

This section briefly summarizes the HHRA protocol and results and interprets the results in light of the uncertainty associated with their estimation, to draw realistic conclusions regarding risk to human health.

The Site 28 source area is currently classified for seasonal residential use; however, permanent residential use was considered in the HHRA to support evaluation of all plausible receptor scenarios. Site 21 was evaluated similarly.

7.1 CONCLUSIONS FOR THE CURRENT AND FUTURE SEASONAL RESIDENT

Site 21. For the current and future seasonal resident at Site 21, non-carcinogenic hazard estimates from exposure to arsenic in soil are below the acceptable ADEC and EPA risk management level of 1 for the adult and child (HI = 0.01 and 0.08, respectively). Carcinogenic risks from exposure to arsenic in soil are within the acceptable EPA risk management range of 1×10^{-4} and 1×10^{-6} and below the ADEC risk management level of 1×10^{-5}.

Site 28. For the current and future seasonal resident at Site 28, non-carcinogenic hazard estimates from exposure to COPCs in soil are below the acceptable ADEC and EPA risk management level of 1 for the adult and child (HI = 0.05 and 0.4, respectively).

For the current and future adult seasonal resident at Site 28, carcinogenic risks from exposure to COPCs in soil are within the acceptable EPA risk management range of 1×10^{-4} and 1×10^{-6} and below the ADEC risk management level of 1×10^{-5}. For the current and future child seasonal resident, non-carcinogenic and carcinogenic risks from exposure to COPCs in soil are within the acceptable EPA risk management range of 1×10^{-4} and 1×10^{-6} and slightly above the ADEC risk management level of 1×10^{-5}. The COPC in soil driving the ILCR is arsenic (ILCR = 1×10^{-5} for arsenic out of the 2×10^{-5} total). An arsenic cleanup level of 22 mg/kg has been calculated that would be protective of the child seasonal resident. The current EPC is

30.54 mg/kg for arsenic in soil, but this soil is below standing water in most cases. Eight locations exceed this level according to the 2013 data.

7.2 CONCLUSIONS FOR THE HYPOTHETICAL FUTURE RESIDENT

Site 21. For the future resident at Site 21, non-carcinogenic hazard estimates from exposure to arsenic in soil are below the acceptable ADEC and EPA risk management level of 1 for the adult and child (HI = 0.03 and 0.3, respectively). Carcinogenic risks from exposure to arsenic in soil are within the acceptable EPA risk management range of 1×10^{-4} and 1×10^{-6} and below the ADEC risk management level of 1×10^{-5}.

Site 28. For the future resident at Site 28, non-carcinogenic hazard estimates from exposure to COPCs in soil are below the acceptable ADEC and EPA risk management level of 1 for the adult (HI = 0.7), but equal to the risk management level for the child (HI = 1). The COPC in soil driving the HI for the child is arsenic (HI = 1).

Carcinogenic risks from exposure to COPCs in soil are within the acceptable EPA risk management range of 1×10^{-4} and 1×10^{-6} and above the ADEC risk management level of 1×10^{-5} (ILCR = 3×10^{-5}). For the current and future child seasonal resident, non-carcinogenic and carcinogenic risks from exposure to COPCs in soil are within the acceptable EPA risk management range of 1×10^{-4} and 1×10^{-6} and above the ADEC risk management level of 1×10^{-5} (ILCR = 5×10^{-5}). The COPC in soil driving the ILCR is arsenic (Adult arsenic ILCR 2×10^{-5}, Child arsenic ILCR = 4×10^{-5}).

However, the risk estimates for Site 28 are likely overestimated given that the site is a drainage that contains water during most, if not all, of the year.

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APPENDIX A
ProUCL Exposure Point Concentration Tables and Input/Output Files

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Background Threshold Value Input and Output

Pro-UCL Input Data for Background Threshold Values

Sample ID	Arsenic	D_Arsenic
14NC21SS001-1	2	1
14NC21SS001-2	3.2	1
14NC21SS001-3	4.7	1
14NC21SS002-1	4.6	1
14NC21SS002-2	4.2	1
14NC21SS002-3	4.8	1
14NC21SS003-1	3.7	1
14NC21SS003-2	4.2	1
14NC21SS003-3	6	1
14NC21SS004-1	2.3	1
14NC21SS004-2	5.2	1
14NC21SS004-3	5.8	1
14NC21SS005-1	4.9	1
14NC21SS005-2	3.4	1
14NC21SS005-3	3.4	1
14NC21SS006-1	5.9	1
14NC21SS006-2	3.8	1
14NC21SS006-3	4.2	1
14NC21SS007-1	3	1
14NC21SS007-2	3.8	1
14NC21SS007-3	5.9	1
14NC21SS008-1	5	1
14NC21SS008-2	5.2	1
14NC21SS008-4D	4.1	1
14NC21SS009-1	5.6	1
14NC21SS009-2	5.5	1
14NC21SS009-3	11	1
14NC21SS010-1	4	1
14NC21SS010-2	4.6	1
14NC21SS010-3	1.6	1
14NC21SS011-1	7.6	1
14NC21SS011-2	4.6	1
14NC21SS011-3	11	1
14NC21SS012-1	2.9	1
14NC21SS012-2	5	1
14NC21SS012-3	**12**	1
14NC21SS013-1	3.1	1
14NC21SS013-2	1.9	1
14NC21SS013-3	6.2	1
14NC21SS014-1	1.5	1
14NC21SS014-2	1.9	1
14NC21SS014-3	3.5	1
14NC21SS015-1	2.1	1
14NC21SS015-2	**12**	1
14NC21SS015-3	9.5	1
14NC21SS016-1	4.5	1
14NC21SS016-2	3	1
14NC21SS016-3	2.6	1
14NC21SS017-1	3.2	1
14NC21SS017-2	3.1	1
14NC21SS017-3	7.8	1
14NC21SS018-1	1.7	1
14NC21SS018-2	7.5	1
14NC21SS018-3	**17**	1
14NC21SS019-1	6.6	1
14NC21SS019-4D	5.8	1
14NC21SS019-3	2.5	1
14NC21SS020-1	3.1	1
14NC21SS020-2	3.4	1
14NC21SS020-3	4.4	1
14NC21SS021-1	7.6	1
14NC21SS021-2	3.1	1

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Background Threshold Value Input and Output

Pro-UCL Input Data for Background Threshold Values

Sample ID	Arsenic	D_Arsenic
14NC21SS021-3	5.2	1
14NC21SS022-1	4.3	1
14NC21SS022-2	2.5	1
14NC21SS022-3	4.6	1
14NC21SS023-1	**23**	1
14NC21SS023-2	**12**	1
14NC21SS023-3	6.9	1
14NC21SS024-1	11	1
14NC21SS024-2	10	1
14NC21SS024-3	**17**	1
14NC21SS025-1	6.2	1
14NC21SS025-4D	3.4	1
14NC21SS025-3	6.2	1
14NC21SS026-1	5.3	1
14NC21SS026-2	3.3	1
14NC21SS026-3	5.3	1
14NC21SS027-1	2.2	1
14NC21SS027-2	2.4	1
14NC21SS027-3	5.3	1
14NC21SS028-1	3.7	1
14NC21SS028-2	4.3	1
14NC21SS028-3	4.5	1
14NC21SS029-4D	5.1	1
14NC21SS029-2	3.3	1
14NC21SS029-3	3.6	1
14NC21SS030-1	8.2	1
14NC21SS030-2	3	1
14NC21SS030-3	3.5	1
14NC21SS031-1	4.5	1
14NC21SS031-2	5.1	1
14NC21SS031-3	3.5	1
14NC21SS032-1	6.8	1
14NC21SS032-2	5.8	1
14NC21SS032-3	3.9	1
14NC21SS033-1	5	1
14NC21SS033-4D	2.5	1
14NC21SS033-3	2.7	1
14NC21SS034-1	4.8	1
14NC21SS034-2	6.1	1
14NC21SS034-3	6.3	1
14NC21SS035-1	5.8	1
14NC21SS035-2	6.6	1
14NC21SS035-3	6	1
14NC21SS036-1	5.5	1
14NC21SS036-2	4.4	1
14NC21SS036-4D	8.4	1
14NC21SS037-1	4	1
14NC21SS037-2	5.2	1
14NC21SS037-3	8.3	1
14NC21SS038-1	8.4	1
14NC21SS038-2	5.8	1
14NC21SS038-3	5.7	1
14NC21SS039-1	8	1
14NC21SS039-2	7.5	1
14NC21SS039-3	4.7	1
14NC21SS040-1	5.6	1
14NC21SS040-2	8.8	1
14NC21SS040-3	7.6	1
14NC21SS041-1	3.8	1
14NC21SS041-2	2.9	1
14NC21SS041-3	3.9	1
14NC21SS042-1	4.1	1

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Background Threshold Value Input and Output

Pro-UCL Input Data for Background Threshold Values

Sample ID	Arsenic	D_Arsenic
14NC21SS042-2	3	1
14NC21SS042-3	8.7	1
14NC21SS043-1	10	1
14NC21SS043-2	3.8	1
14NC21SS043-3	2.9	1
14NC21SS044-1	7.9	1
14NC21SS044-2	4.2	1
14NC21SS044-3	5	1
14NC21SS045-1.5	4.5	1
14NC21SS045-2	4.2	1
14NC21SS045-3	5.7	1
14NC21SS046-1	2.2	1
14NC21SS046-2	4.2	1
14NC21SS046-3	5.3	1
14NC21SS047-1	2.9	1
14NC21SS047-2	3.4	1
14NC21SS047-3	6.9	1
14NC21SS048-1.5	7.3	1
14NC21SS048-2	6.2	1
14NC21SS048-3	5.6	1
14NC21SS049-1	6.6	1
14NC21SS049-2	5.8	1
14NC21SS049-3	9.7	1

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Sample Data for Background Threshold Value

Samples collected from soil borings for background analysis

		Sample ID	14NC21SS001-1	14NC21SS001-2	14NC21SS001-3	14NC21SS002-1	14NC21SS002-2	14NC21SS002-3
		Laboratory ID	580-44007-1	580-44007-2	580-44007-3	580-44007-4	580-44007-5	580-44007-6
		Location ID	SS001-1	SS001-2	SS001-3	SS002-1	SS002-2	SS002-3
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	2	3.2	4.7	4.6 J	4.2	4.8

		Sample ID	14NC21SS003-1	14NC21SS003-2	14NC21SS003-3	14NC21SS004-1	14NC21SS004-2	14NC21SS004-3
		Laboratory ID	580-44007-7	580-44007-8	580-44007-9	580-44007-10	580-44007-11	580-44007-12
		Location ID	SS003-1	SS003-2	SS003-3	SS004-1	SS004-2	SS004-3
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	3.7	4.2	6	2.3	5.2	5.8

		Sample ID	14NC21SS005-1	14NC21SS005-2	14NC21SS005-3	14NC21SS005-4 D	14NC21SS006-1	14NC21SS006-2
		Laboratory ID	580-44007-13	580-44007-14	580-44007-15	580-44007-16	580-44007-17	580-44007-18
		Location ID	SS005-1	SS005-2	SS005-3	SS005-4	SS006-1	SS006-2
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	4.9	3.4	3.4	3.4	5.9	3.8

		Sample ID	14NC21SS006-3	14NC21SS007-1	14NC21SS007-2	14NC21SS007-3	14NC21SS008-1	14NC21SS008-2
		Laboratory ID	580-44007-19	580-44007-20	580-44007-21	580-44007-22	580-44007-23	580-44007-24
		Location ID	SS005-3	SS007-1	SS007-2	SS007-3	SS008-1	SS008-2
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	4.2	3	3.8	5.9	5	5.2

		Sample ID	14NC21SS008-3	14NC21SS008-4 D	14NC21SS009-1	14NC21SS009-2	14NC21SS009-3	14NC21SS010-1
		Laboratory ID	580-44007-25	580-44007-26	580-44007-27	580-44007-28	580-44007-29	580-44007-30
		Location ID	SS008-3	SS008-4	SS009-1	SS009-2	SS009-3	SS010-1
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	4.4	4.1	5.6	5.5	11	4

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Sample Data for Background Threshold Value

		Sample ID	14NC21SS010-2	14NC21SS010-3	14NC21SS010-4 [D]	14NC21SS011-1	14NC21SS011-2	14NC21SS011-3
		Laboratory ID	580-44007-31	580-44007-32	580-44007-33	580-44007-34	580-44007-35	580-44007-36
		Location ID	SS010-2	SS010-3	SS010-4	SS011-1	SS011-2	SS011-3
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	4.6	1.6	1.6	7.6	4.6	11

		Sample ID	14NC21SS012-1	14NC21SS012-2	14NC21SS012-3	14NC21SS013-1	14NC21SS013-2	14NC21SS013-3
		Laboratory ID	580-44007-37	580-44007-38	580-44007-39	580-44007-40	580-44007-41	580-44007-42
		Location ID	SS012-1	SS012-2	SS012-3	SS013-1	SS013-2	SS013-3
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	2.9	5	**12**	3.1	1.9	6.2

		Sample ID	14NC21SS014-1	14NC21SS014-2	14NC21SS014-3	14NC21SS015-1	14NC21SS015-4 [D]	14NC21SS015-2
		Laboratory ID	580-44007-43	580-44007-44	580-44007-45	580-44007-46	580-44007-49	580-44007-47
		Location ID	SS014-1	SS014-2	SS014-3	SS015-1	SS015-4	
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	1.5	1.9	3.5	2.1	2.3	**12**

		Sample ID	14NC21SS015-3	14NC21SS016-1	14NC21SS016-2	14NC21SS016-3	14NC21SS017-1	14NC21SS017-3
		Laboratory ID	580-44007-48	580-44007-50	580-44007-51	580-44007-52	580-44007-53	580-44007-55
		Location ID	SS015-3	SS016-1	SS016-2	SS016-3	SS017-1	SS017-3
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	9.5	4.5	3	2.6	3.2	7.8

		Sample ID	14NC21SS017-2	14NC21SS017-4 [D]	14NC21SS018-1	14NC21SS018-2	14NC21SS018-3	14NC21SS019-1
		Laboratory ID	580-44007-54	580-44007-56	580-44007-57	580-44007-58	580-44007-59	580-44007-60
		Location ID	SS017-2	SS017-4	SS018-1	SS018-2	SS018-3	SS019-1
		Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	3.1	4.3	1.7	7.5	**17**	6.6

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Sample Data for Background Threshold Value

		Sample ID	14NC21SS019-3	14NC21SS019-2	14NC21SS019-4 [D]	14NC21SS020-1	14NC21SS020-2	14NC21SS020-3
		Laboratory ID	580-44007-62	580-44007-61	580-44007-63	580-44007-64	580-44007-65	580-44007-66
		Location ID	SS019-3	SS019-2	SS019-4	SS020-1	SS020-2	SS020-3
		Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	2.5	6.3	5.8	3.1	3.4	4.4

		Sample ID	14NC21SS021-1	14NC21SS021-2	14NC21SS021-3	14NC21SS022-1	14NC21SS022-2	14NC21SS022-3
		Laboratory ID	580-44007-67	580-44007-68	580-44007-69	580-44007-70	580-44007-71	580-44007-72
		Location ID	SS021-1	SS021-2	SS021-3	SSO22-1	SSO22-2	SSO22-3
		Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	7.6	3.1	5.2	4.3	2.5	4.6

		Sample ID	14NC21SS023-1	14NC21SS023-2	14NC21SS023-3	14NC21SS024-1	14NC21SS024-2	14NC21SS024-3
		Laboratory ID	580-44007-73	580-44007-74	580-44007-75	580-44007-76	580-44007-77	580-44007-78
		Location ID	SS023-1	SS023-2	SS023-3	SS024-1	SS024-1	SS024-1
		Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Analyte	**Units**	**Cleanup Level[1]**						
Arsenic	mg/Kg	11	**23**	**12**	6.9	11	10	**17**

		Sample ID	14NC21SS025-1	14NC21SS025-2	14NC21SS025-4 [D]	14NC21SS025-3	14NC21SS026-1	14NC21SS026-2
		Laboratory ID	580-44007-79	580-44007-80	580-44007-82	580-44007-81	580-44007-83	580-44007-84
		Location ID	SS025-1	SS025-2	SS025-4	SS025-3	SS026-1	SS026-2
		Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	6.2	6.1 QN	3.4 QN	6.2	5.3	3.3

		Sample ID	14NC21SS026-3	14NC21SS027-1	14NC21SS027-2	14NC21SS027-3	14NC21SS027-4 [D]	14NC21SS028-1
		Laboratory ID	580-44007-85	580-44007-86	580-44007-87	580-44007-88	580-44007-89	580-44007-90
		Location ID	SS026-3	SS027-1	SS027-2	SS027-3	SS027-4	SS028-1
		Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	5.3	2.2	2.4	5.3	5.4	3.7

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Sample Data for Background Threshold Value

		Sample ID	14NC21SS028-2	14NC21SS028-3	14NC21SS029-1	14NC21SS029-4 [D]	14NC21SS029-2	14NC21SS029-3
		Laboratory ID	580-44007-91	580-44007-92	580-44007-93	580-44007-96	580-44007-94	580-44007-95
		Location ID	SS028-2	SS028-3	SS029-1	SS029-4	SS029-2	SS029-3
		Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	4.3	4.5	5.3	5.1	3.3	3.6

		Sample ID	14NC21SS030-1	14NC21SS030-2	14NC21SS030-3	14NC21SS031-1	14NC21SS031-2	14NC21SS031-3
		Laboratory ID	580-44007-97	580-44007-98	580-44007-99	580-44007-100	580-44007-101	580-44007-102
		Location ID	SS030-1	SS030-2	SS030-3	SS031-1	SS031-2	SS031-3
		Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	8.2	3	3.5	4.5	5.1	3.5

		Sample ID	14NC21SS032-1	14NC21SS032-2	14NC21SS032-3	14NC21SS033-1	14NC21SS033-2	14NC21SS033-4 [D]
		Laboratory ID	580-44007-103	580-44007-104	580-44007-105	580-44007-106	580-44007-107	580-44007-109
		Location ID	SS032-1	SS032-2	SS032-3	SS033-1	SS033-2	SS033-4
		Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	6.8	5.8	3.9	5	2.7	2.5

		Sample ID	14NC21SS033-3	14NC21SS034-1	14NC21SS034-2	14NC21SS034-3	14NC21SS035-1	14NC21SS035-3
		Laboratory ID	580-44007-108	580-44007-110	580-44007-111	580-44007-112	580-44007-113	580-44007-115
		Location ID	SS033-3	SS034-1	SS034-2	SS034-3	SS035-1	SS035-3
		Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/13/2014	6/13/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	2.7	4.8	6.1	6.3	5.8	6

		Sample ID	14NC21SS035-2	14NC21SS035-4 [D]	14NC21SS036-1	14NC21SS036-2	14NC21SS036-3	14NC21SS036-4 [D]
		Laboratory ID	580-44007-114	580-44007-116	580-44007-117	580-44007-118	580-44007-119	580-44007-120
		Location ID	SS035-2	SS035-4	SS036-1	SS036-2	SS036-3	SS036-4
		Collection Date	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014
Analyte	Units	Cleanup Level*						
Arsenic	mg/Kg	11	6.6	7.4	5.5	4.4	10	8.4

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Sample Data for Background Threshold Value

		Sample ID	14NC21SS037-1	14NC21SS037-2	14NC21SS037-3	14NC21SS038-1	14NC21SS038-2	14NC21SS038-3
		Laboratory ID	580-44007-121	580-44007-122	580-44007-123	580-44007-124	580-44007-125	580-44007-126
		Location ID	SS037-1	SS037-2	SS037-3	SS038-1	SS038-2	SS038-3
		Collection Date	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	4	5.2	8.3	8.4	5.8	5.7

		Sample ID	14NC21SS039-1	14NC21SS039-2	14NC21SS039-3	14NC21SS040-1	14NC21SS040-2	14NC21SS040-3
		Laboratory ID	580-44007-127	580-44007-128	580-44007-129	580-44007-130	580-44007-131	580-44007-132
		Location ID	SS039-1	SS039-2	SS039-3	SS040-1	SS040-2	SS040-3
		Collection Date	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014
Analyte	**Units**	**Cleanup Level***						
Arsenic	mg/Kg	11	8	7.5	4.7	5.6	8.8	7.6

		Sample ID	14NC21SS041-1	14NC21SS041-2	14NC21SS041-3	14NC21SS042-1	14NC21SS042-2	14NC21SS042-3
		Laboratory ID	580-44839-1	580-44839-2	580-44839-3	580-44839-4	580-44839-5	580-44839-6
		Location ID	21SS041-1	21SS041-2	21SS041-3	21SS042-1	21SS042-2	21SS042-3
		Collection Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014
Analyte	**Units**	**Regulatory Limit[1]**						
Arsenic	mg/Kg	11	3.8	2.9	3.9	4.1	3.0	8.7

		Sample ID	14NC21SS043-1	14NC21SS043-2	14NC21SS043-3	14NC21SS044-1	14NC21SS044-2	14NC21SS044-3
		Laboratory ID	580-44839-7	580-44839-8	580-44839-9	580-44839-10	580-44839-11	580-44839-12
		Location ID	SS043-1	SS043-2	SS043-3	SS044-1	SS044-2	SS044-3
		Collection Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014
Analyte	**Units**	**Regulatory Limit[1]**						
Arsenic	**mg/Kg**	11	10	3.8	2.9	7.9	4.2	5.0

		Sample ID	14NC21SS045-1	14NC21SS045-1.5[D]	14NC21SS045-2	14NC21SS045-3	14NC21SS046-1	14NC21SS046-2
		Laboratory ID	580-44839-13	580-44839-14	580-44839-15	580-44839-16	580-44839-17	580-44839-18
		Location ID	SS045-1	SS045-1.5	SS045-2	SS045-3	SS046-1	SS046-2
		Collection Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014
Analyte	**Units**	**Regulatory Limit[1]**						
Arsenic	**mg/Kg**	11	6.4	4.5	4.2	5.7	2.2	4.2

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Sample Data for Background Threshold Value

		Sample ID	14NC21SS046-3	14NC21SS047-1	14NC21SS047-2	14NC21SS047-3	14NC21SS048-1	14NC21SS048-1.5[D]
		Laboratory ID	580-44839-19	580-44839-20	580-44839-21	580-44839-22	580-44839-23	580-44839-24
		Location ID	SS046-3	SS047-1	SS047-2	SS047-3	SS048-1	SS048-1.5
		Collection Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014
Analyte	**Units**	**Regulatory Limit[1]**						
Arsenic	**mg/Kg**	11	5.3	2.9	3.4	6.9	9.1	7.3

		Sample ID	14NC21SS048-2	14NC21SS048-3	14NC21SS049-1	14NC21SS049-1.5[D]	14NC21SS049-2	14NC21SS049-3
		Laboratory ID	580-44839-25	580-44839-26	580-44839-27	580-44839-28	580-44839-29	580-44839-30
		Location ID	SS048-2	SS048-3	SS049-1	SS049-1.5	SS049-2	SS049-3
		Collection Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014
Analyte	**Units**	**Regulatory Limit[1]**						
Arsenic	**mg/Kg**	11	6.2	5.6	6.6	8.5	5.8 J	9.7

Notes:

*Site-specific cleanup levels established in 2009 Decision Document

BOLD = Indicates sample concentration above cleanup level

mg/Kg = milligrams per kilogram

D = indicates duplicate of the preceding sample

For duplicates, the lower of the primary or duplicate was used to calculate background values.

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Background Threshold Value Input and Output

Revised Background Threshold Values

Background Statistics for Uncensored Full Data Sets

User Selected Options				
Date/Time of Computation	10/26/2015 8:22			
From File	WorkSheet.xls			
Full Precision	OFF			
Confidence Coefficient	95%			
Coverage	95%			
New or Future K Observations	1			
Number of Bootstrap Operations	2000			

Site 21 COPC: Arsenic

General Statistics				
Total Number of Observations		147	Number of Distinct Observations	67
Minimum		1.5	First Quartile	3.45
Second Largest		17	Median	4.8
Maximum		23	Third Quartile	6.2
Mean		5.419	SD	3.032
Coefficient of Variation		0.559	Skewness	2.399
Mean of logged Data		1.569	SD of logged Data	0.482

Critical Values for Background Threshold Values (BTVs)				
Tolerance Factor K (For UTL)		1.87	d2max (for USL)	3.336
Normal GOF Test				
Shapiro Wilk Test Statistic		0.821	Normal GOF Test	
5% Shapiro Wilk P Value		0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic		0.16	Lilliefors GOF Test	
5% Lilliefors Critical Value		0.0731	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level				

Background Statistics Assuming Normal Distribution				
95% UTL with 95% Coverage		11.09	90% Percentile (z)	9.304
95% UPL (t)		10.45	95% Percentile (z)	10.41
95% USL		15.53	99% Percentile (z)	12.47

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Background Threshold Value Input and Output

Revised Background Threshold Values

Gamma GOF Test				
A-D Test Statistic		1.128	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value		0.756	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic		0.09	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value		0.0776	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level				

Gamma Statistics				
k hat (MLE)		4.296	k star (bias corrected MLE)	4.213
Theta hat (MLE)		1.261	Theta star (bias corrected MLE)	1.286
nu hat (MLE)		1263	nu star (bias corrected)	1239
MLE Mean (bias corrected)		5.419	MLE Sd (bias corrected)	2.64

Background Statistics Assuming Gamma Distribution				
95% Wilson Hilferty (WH) Approx. Gamma UPL		10.34	90% Percentile	8.957
95% Hawkins Wixley (HW) Approx. Gamma UPL		10.39	95% Percentile	10.36
95% WH Approx. Gamma UTL with 95% Coverage		11.21	99% Percentile	13.35
95% HW Approx. Gamma UTL with 95% Coverage		11.31		
95% WH USL		18.66	95% HW USL	19.55

Lognormal GOF Test				
Shapiro Wilk Test Statistic		0.985	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value		0.742	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic		0.0599	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value		0.0731	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level				

Background Statistics assuming Lognormal Distribution				
95% UTL with 95% Coverage		11.82	90% Percentile (z)	8.904
95% UPL (t)		10.69	95% Percentile (z)	10.61
95% USL		23.97	99% Percentile (z)	14.73
Nonparametric Distribution Free Background Statistics				
Data appear Lognormal at 5% Significance Level				

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Background Threshold Value Input and Output

Revised Background Threshold Values

Nonparametric Upper Limits for Background Threshold Values				
Order of Statistic, r		143	95% UTL with 95% Coverage	12
Approximate f		1.505	Confidence Coefficient (CC) achieved by UTL	0.863
95% Percentile Bootstrap UTL with 95% Coverage		12	95% BCA Bootstrap UTL with 95% Coverage	12
95% UPL		11	90% Percentile	8.52
90% Chebyshev UPL		14.55	95% Percentile	11
95% Chebyshev UPL		18.68	99% Percentile	17
95% USL		23		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
ProUCL input data for Soil Arsenic Risk Calculations

Sample ID	Arsenic	D_Arsenic
14NC21SS001	3.7	1
14NC21SS002	5.8	1
14NC21SS004	13	1
14NC21SS005	5.2	1
14NC21SS006	3.3	1
14NC21SS007	7.6	1
14NC21SS008	2.9	1
14NC21SS009	6.2	1
14NC21SS010	7.4	1
14NC21SS011	9.4	1
14NC21SS012	10	1
14NC21SS013	4.8	1
14NC21SS014	3.8	1
14NC21SS015	10	1
14NC21SS016	3.4	1
14NC21SS017	9.1	1
14NC21SS019	3.6	1
14NC21SS020	2.5	1
14NC21SS021	4.5	1
14NC21SS022	5.8	
14NC21SS024D	3.1	1
14NC21SS025	5.9	1
14NC21SS026	6.6	1
14NC21SS027	6.9	1
14NC21SS029	6.5	1
14NC21SS030	6.7	1
14NC21SS031	6.5	1
14NC21SS032	7.8	1
14NC21SS033	7.1	1
14NC21SS034	5.8	1
14NC21SS035	7.9	1
12NC21SS02	4	1
12NC21SS03	5.2	1
12NC21SS04	6	1
12NC21SS06	6.1	1
12NC21SS07	8.8	1
12NC21SS09	9.4	1
12NC21SS11	4.7	1
12NC21SS12	5.6	1
12NC21SS21	5.3	1
13NC21SS02-0.5	6.5	1
13NC21SS03-0.5	5.5	1
13NC21SS04-3	8.1	1
13NC21SS05-2.5	4.2	1
13NC21SS06-3	6	1
13NC21SS07-2	6.6	1
13NC21SS09-3	5.4	1
13NC21SS14-0.5	11	1
13NC21SS16-2	5.6	1
13NC21SS17-0.5	14	1
13NC21SS19-3	4.4	1

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
ProUCL input data for Soil Arsenic Risk Calculations

Sample ID	Arsenic	D_Arsenic
13NC21SS20-0.5	10	1
13NC21SS021	6	1
13NC21SS022	4.4	1
13NC21SS025	9.9	1
13NC21SS031	7.6	1
13NC21SS033	5.8	1
13NC21SS034	4.4	1
13NC21SS037	5.7	1
13NC21SS038	4.4	1
13NC21SS042	2	1
13NC21SS043	17	1
13NC21SS044	11	1
13NC21SS048	6.7	1
13NC21SS049	5.1	1

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Sample Summary data for ProUCL Input Values, Soil Arsenic Exposure Point Concentration Calculations

2013 Soil samples from Borings to plan Excavation (only the one highest remaining result from each boring location was used)

		Sample ID	13NC21SS02-0.5	13NC21SS03-0.5	13NC21SS04-3	13NC21SS05-2.5	13NC21SS06-3
		Laboratory ID	580-39336-4	580-39336-7	580-39336-12	580-39336-53	580-39336-18
		Location ID	13NC21SB02	13NC21SB03	13NC21SB04	13NC21SB05	13NC21SB06
		Collection Date	7/11/2013	7/11/2013	7/11/2013	7/11/2013	7/11/2013
		Soil Boring Depth	SB02-0.5'	SB03-0.5'	SB04-3.0'	SB05-2.0'	SB06-3.0'
Analyte	**Unit**	**Cleanup Level***					
Arsenic	mg/Kg	11	6.5	5.5	8.1	4.2	6.0

		Sample ID	13NC21SS07-2	13NC21SS09-3	13NC21SS14-0.5	13NC21SS16-2	13NC21SS17-0.5
		Laboratory ID	580-39336-20	58039336-27	58039336-40	58039336-47	58039336-49
		Location ID	13NC21SB07	13NC21SB09	13NC21SB14	13NC21SB16	13NC21SB17
		Collection Date	7/12/2013	7/12/2013	7/11/2013	7/11/2013	7/11/2013
		Soil Boring Depth	SB07-2.0'	SB09-3.0'	SB14-0.5'	SB16-2.0'	SB17-0.5'
Analyte	**Unit**	**Cleanup Level***					
Arsenic	mg/Kg	11	6.6	5.4	11	5.6	**14**

		Sample ID	13NC21SS19-3	13NC21SS20-0.5
		Laboratory ID	580-39511-19	580-39511-20
		Location ID	13NC21SB19	13NC21SB20
		Collection Date	7/25/2013	7/25/2013
		Soil Boring Depth	SB19-3.0'	SB20-0.5'
Analyte	**Unit**	**Cleanup Level***		
Arsenic	mg/Kg	11	4.4	10

Notes:
BOLD = Indicates sample concentration above cleanup level.
*Site-specific cleanup level established in the 2009 Decision Document
mg/Kg = milligrams per kilogram
2013 location 113NC21SB01 is presumed to have been removed by the 2014 excavation near 13NC21SS023 and replaced by 14NC21SS01
2013 location 21SB08 appears to have been excavated to 3.5 feet so all 3 samples were removed from the data set.
2013 locations 21SB10, 21SB11, 21SB12, 21SB13, and 21SB15 appear to have been excavated so all 3 samples were removed from the data set
2013 location 21SB18 was excavated in 2013 at the shallow depth and presumed to have been excavated completely in 2014 with 13NC21SS047 and replaced by 14NC21SS10, SS11 and SS12

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Sample Summary data for ProUCL Input Values, Soil Arsenic Exposure Point Concentration Calculations

Excavation confirmation results remaining after 2014 excavation was complete

		Sample ID	12NC21SS002	12NC21SS003	12NC21SS004	12NC21SS006	12NC21SS07	12NC21SS009
		Laboratory ID	580-34550-2	580-34550-3	580-34550-4	580-34550-6	580-34550-7	580-34550-9
		Location ID	NC21SS002	NC21SS003	NC21SS004	NC21SS006	NC21SS007	NC21SS009
		Collection Date	8/15/2012	8/15/2012	8/15/2012	8/15/2012	8/15/2012	8/15/2012
Analyte	**Unit**	**Cleanup Level***						
Arsenic	mg/Kg	11	4	5.2	6	6.1	8.8	9.4

		Sample ID	12NC21SS011D	12NC21SS012	12NC21SS021	13NC21SS021	13NC21SS022	13NC21SS025
		Laboratory ID	580-34550-11	580-34550-12	580-34828-7	580-39959-1	580-39959-2	580-39959-5
		Location ID	NC21SS011	NC21SS012	NC21SS021	21-021	21-022	21-025
		Collection Date	8/15/2012	8/15/2012	9/4/2012	8/23/2013	8/23/2013	8/23/2013
Analyte	**Unit**	**Cleanup Level***						
Arsenic	mg/Kg	11	4.7	5.6	5.3	6.0	4.4	9.9

		Sample ID	13NC21SS031	13NC21SS033	13NC21SS034	13NC21SS037	13NC21SS038	13NC21SS042
		Laboratory ID	580-39959-11	580-39959-13	580-39959-14	580-39959-17	580-39959-18	580-39959-22
		Location ID	21-030	21-032	21-033	21-035	21-036	21-040
		Collection Date	8/23/2013	8/24/2013	8/24/2013	8/24/2013	8/24/2013	8/24/2013
Analyte	**Unit**	**Cleanup Level***						
Arsenic	mg/Kg	11	7.6	5.8	4.4	5.7	4.4	2.0

		Sample ID	13NC21SS043	13NC21SS044	13NC21SS048	13NC21SS049	13NC21SS050	13NC21SS051
		Laboratory ID	580-40164-1	580-40164-2	580-40164-6	580-40164-7	580-40164-8	580-40164-9
		Location ID	21-SS043	21-SS044	21-SS048	21-SS049	21-SS050	21-SS051
		Collection Date	9/3/2013	9/3/2013	9/3/2013	9/3/2013	9/3/2013	9/3/2013
Analyte	**Unit**	**Cleanup Level***						
Arsenic	mg/Kg	11	**17**	11	6.7	5.1	7	7.9

Notes:

*Site-specific cleanup levels established in the 2009 Decision Document

BOLD = Indicates sample concentration above cleanup level

mg/Kg = milligrams per kilogram

For duplicates, only the higher of the primary or duplicate is shown in this list.

Location 13NC21SS039 (2.2 mg/kg) is presumed removed in 2014 along with 13NC21SS047 (29mg/kg) and replaced with 2014 confirmation samples

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Sample Summary data for ProUCL Input Values, Soil Arsenic Exposure Point Concentration Calculations

Excavation confirmation results remaining after 2014 excavation was complete

		Sample ID	14NC21SS001	14NC21SS002	14NC21SS003[D]	14NC21SS004	14NC21SS005	14NC21SS006	14NC21SS007
		Laboratory ID	580-44891-4	580-44891-5	580-44891-6	580-44912-1	580-44912-2	580-44912-3	580-44912-4
		Location ID	21SS001	21SS002	21SS003	21SS004	21SS005	21SS006	21SS007
		Collection Date	8/7/2014	8/7/2014	8/7/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014
Analyte	**Unit**	**Cleanup Level[1]**							
Arsenic	mg/Kg	11	3.7	5.8	5.3	**13**	5.2	3.3	7.6

		Sample ID	14NC21SS008	14NC21SS009	14NC21SS010	14NC21SS011	14NC21SS012	14NC21SS013	14NC21SS014
		Laboratory ID	580-44912-5	580-44912-6	580-44912-7	580-44912-8	580-44912-9	580-44912-10	580-44912-11
		Location ID	21SS008	21SS009	21SS010	21SS011	21SS012	21SS013	21SS014
		Collection Date	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014
Analyte	**Unit**	**Cleanup Level***							
Arsenic	mg/Kg	11	2.9	6.2	7.4	9.4	10	4.8	3.8

		Sample ID	14NC21SS015	14NC21SS016	14NC21SS017	14NC21SS018[D]	14NC21SS019	14NC21SS020	14NC21SS021
		Laboratory ID	580-44912-12	580-44912-13	580-44912-14	580-44912-15	580-44912-16	580-44912-17	580-44912-18
		Location ID	21SS015	21SS016	21SS017	21SS018	21SS019	21SS020	21SS021
		Collection Date	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014
Analyte	**Unit**	**Cleanup Level***							
Arsenic	mg/Kg	11	10	3.4	9.1	7.4	3.6	2.5	4.5

		Sample ID	14NC21SS022	14NC21SS023	14NC21SS024[D]	14NC21SS025	14NC21SS026	14NC21SS027	14NC21SS028[D]
		Laboratory ID	580-44912-19	580-44912-20	580-44912-21	580-45035-1	580-45035-2	580-45035-3	580-45035-4
		Location ID	21SS022	21SS023	21SS024	21SS025	21SS026	21SS027	21SS028
		Collection Date	8/10/2014	8/10/2014	8/11/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014
Analyte	**Unit**	**Cleanup Level***							
Arsenic	mg/Kg	11	5.8	2.1	3.1	5.9	6.6	6.9	6.5

		Sample ID	14NC21SS029	14NC21SS030	14NC21SS031	14NC21SS032	14NC21SS033	14NC21SS034	14NC21SS035
		Laboratory ID	580-45035-5	580-45035-6	580-45035-7	580-45035-8	580-45035-9	580-45035-10	580-45035-11
		Location ID	21SS029	21SS030	21SS031	21SS032	21SS033	21SS034	21SS035
		Collection Date	8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014
Analyte	**Unit**	**Cleanup Level***							
Arsenic	mg/Kg	11	6.5	6.7	6.5	7.8	7.1	5.8	7.9

Notes:

*Site-specific cleanup levels established in 2009 Decision Document

BOLD = Indicates sample concentration above cleanup level

mg/Kg = milligrams per kilogram

D = indicates duplicate of the preceding sample+A1

For duplicates, only the higher of the primary or duplicate was selected for the UCL analysis

Location 13NC21SS039 (2.2 mg/kg) is presumed removed in 2014 along with 13NC21SS047 (29mg/kg) and replaced with 2014 confirmation samples

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
ProUCL Calculations for Soil Arsenic Risk Exposure Point Concentration

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	10/26/2015 8:29
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic

General Statistics

Total Number of Observations	67	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	2	Mean	6.569
Maximum	17	Median	6
SD	2.743	Std. Error of Mean	0.335
Coefficient of Variation	0.418	Skewness	1.308

Normal GOF Test

Shapiro Wilk Test Statistic	0.919	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	1.93E-04	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.138	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.108	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	7.128	95% Adjusted-CLT UCL (Chen-1995)	7.177
		95% Modified-t UCL (Johnson-1978)	7.137

Gamma GOF Test

A-D Test Statistic	0.369	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0845	Kolmogrov-Smirnoff Gamma GOF Test
5% K-S Critical Value	0.109	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.428	k star (bias corrected MLE)	6.15
Theta hat (MLE)	1.022	Theta star (bias corrected MLE)	1.068
nu hat (MLE)	861.3	nu star (bias corrected)	824.1
MLE Mean (bias corrected)	6.569	MLE Sd (bias corrected)	2.649
		Approximate Chi Square Value (0.05)	758.4

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
ProUCL Calculations for Soil Arsenic Risk Exposure Point Concentration

Adjusted Level of Significance	0.0464	Adjusted Chi Square Value	757.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	7.137	95% Adjusted Gamma UCL (use when n<50)	7.15
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.991	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	0.979	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0682	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.108	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.693	Mean of logged Data	1.803
Maximum of Logged Data	2.833	SD of logged Data	0.404
Assuming Lognormal Distribution			
95% H-UCL	7.202	90% Chebyshev (MVUE) UCL	7.581
95% Chebyshev (MVUE) UCL	8.038	97.5% Chebyshev (MVUE) UCL	8.672
99% Chebyshev (MVUE) UCL	9.917		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	7.12	95% Jackknife UCL	7.128
95% Standard Bootstrap UCL	7.116	95% Bootstrap-t UCL	7.183
95% Hall's Bootstrap UCL	7.244	95% Percentile Bootstrap UCL	7.133
95% BCA Bootstrap UCL	7.185		
90% Chebyshev(Mean, Sd) UCL	7.574	95% Chebyshev(Mean, Sd) UCL	8.029
97.5% Chebyshev(Mean, Sd) UCL	8.661	99% Chebyshev(Mean, Sd) UCL	9.902
Suggested UCL to Use			
95% Approximate Gamma UCL	7.137		

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.

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Statistical Input Data

Sample ID	Arsenic	D_Arsenic	Barium	D_Barium	Cadmium	D_Cadmium	Chromium	D_Chromium	Lead	D_Lead	Nickel	D_Nickel	Selenium	D_Selenium	Silver	D_Silver	Vanadium	D_Vanadium	Zinc	D_Zinc
13NC28SS001	6	1	150	1	0.4	1	31	1	21	1	24	1	2	1	0.14	1	46	1	94	1
13NC28SS003[D]	8.2	1	160	1	0.62	1	29	1	33	1	19	1	2.7	1	0.16	1	48	1	93	1
13NC28SS004	6.9	1	110	1	0.29	1	28	1	27	1	13	1	2.7	1	0.19	1	49	1	56	1
13NC28SS005	6.3	1	120	1	0.31	1	22	1	19	1	13	1	2.2	1	0.14	1	39	1	52	1
13NC28SS006	15	1	140	1	0.77	1	32	1	64	1	22	1	3.2	1	0.28	1	49	1	190	1
13NC28SS007	7.4	1	98	1	0.42	1	18	1	20	1	11	1	1.9	1	0.13	1	34	1	80	1
13NC28SS008	38	1	130	1	0.33	1	9.6	1	13	1	6	1	1.6	1	0.087	1	23	1	150	1
13NC28SS009	19	1	96	1	0.49	1	19	1	17	1	11	1	1.6	1	0.14	1	32	1	180	1
13NC28SS010	5.1	1	27	1	0.041	1	4.2	1	6.4	1	2	1	0.41	1	0.033	0	10	1	17	1
13NC28SS011	14	1	84	1	0.39	1	15	1	14	1	9.7	1	1.6	1	0.11	1	32	1	100	1
13NC28SS012	14	1	50	1	0.23	1	7.7	1	7.4	1	6.4	1	1.9	1	0.077	1	22	1	43	1
13NC28SS013	9.2	1	110	1	0.75	1	22	1	37	1	13	1	1.9	1	0.14	1	32	1	160	1
13NC28SS014	14	1	120	1	0.44	1	11	1	18	1	13	1	2.2	1	0.14	1	45	1	72	1
13NC28SS016	13	1	86	1	0.32	1	18	1	19	1	12	1	0.92	1	0.11	1	34	1	110	1
13NC28SS017	43	1	150	1	0.63	1	22	1	24	1	16	1	1.6	1	0.17	1	43	1	220	1
13NC28SS018	6.6	1	81	1	0.19	1	17	1	12	1	10	1	0.88	1	0.073	1	29	1	66	1
13NC28SS019	6.7	1	91	1	0.24	1	10	1	12	1	8.8	1	1.6	1	0.098	1	20	1	60	1
13NC28SS020	12	1	100	1	0.22	1	15	1	15	1	10	1	1.7	1	0.064	1	35	1	63	1
13NC28SS021	14	1	110	1	0.31	1	21	1	27	1	16	1	1.2	1	0.094	1	45	1	78	1
13NC28SS022	51	1	97	1	0.036	1	4.8	1	3.4	1	2.3	1	1.1	0	0.054	0	11	1	21	1
13NC28SS023	20	1	110	1	0.46	1	18	1	38	1	15	1	1.8	1	0.12	1	50	1	120	1
13NC28SS024	10	1	92	1	0.24	1	13	1	11	1	8.1	1	1.4	1	0.084	0	33	1	57	1
13NC28SS025	10	1	110	1	0.26	1	15	1	11	1	10	1	1.5	1	0.072	1	27	1	52	1
13NC28SS026	48	1	100	1	0.1	1	10	1	7.3	1	4.9	1	0.83	1	0.039	1	21	1	40	1
13NC28SS027	7.7	1	57	1	0.11	1	11	1	7.1	1	5.1	1	1.5	0	0.055	1	17	1	55	1
13NC28SS028	17	1	110	1	0.17	1	16	1	9.6	1	10	1	1.3	1	0.072	1	31	1	46	1
13NC28SS029	4.7	1	94	1	0.23	1	19	1	14	1	11	1	0.88	1	0.076	1	31	1	53	1
13NC28SS031[D]	8.4	1	110	1	0.23	1	16	1	10	1	10	1	1.2	1	0.076	1	30	1	49	1
13NC28SS032	7.3	1	110	1	0.2	1	16	1	9.7	1	11	1	1.2	1	0.075	1	30	1	44	1
13NC28SS033	5.3	1	97	1	0.22	1	21	1	15	1	12	1	0.96	1	0.077	1	33	1	59	1
13NC28SS034	6.4	1	88	1	0.23	1	17	1	14	1	10	1	0.91	1	0.079	1	27	1	67	1
13NC28SS035	88	1	160	1	0.069	1	7.7	1	6.5	1	4	1	1.7	0	0.084	0	18	1	47	1
13NC28SS036	13	1	140	1	0.67	1	27	1	36	1	17	1	1.4	1	0.17	1	41	1	150	1
13NC28SS037	70	1	150	1	0.28	1	14	1	18	1	8	1	1.4	1	0.097	1	27	1	88	1
13NC28SS038	11	1	120	1	0.45	1	22	1	25	1	14	1	1.1	1	0.12	1	33	1	120	1
13NC28SS040[D]	6.5	1	47	1	0.1	1	8	1	7.2	1	7.3	1	0.81	1	0.041	1	14	1	26	1
13NC28SS041	35	1	120	1	0.091	0	11	1	9.5	1	6.8	1	1.2	1	0.064	1	21	1	47	1
13NC28SS043[D]	20	1	82	1	0.15	1	15	1	11	1	10	1	1.1	1	0.069	1	27	1	53	1
13NC28SS044	4.6	1	53	1	0.069	0	9.1	1	8.3	1	5.4	1	0.97	1	0.052	1	16	1	35	1
13NC28SS045	27	1	130	1	0.078	1	14	1	9.7	1	8.4	1	1.4	1	0.073	1	26	1	53	1
13NC28SS046	7.2	1	48	1	0.025	1	8.1	1	9.2	1	5.2	1	0.82	1	0.053	1	19	1	42	1

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Statistical Input Data

Sample ID	Mercury	D_Mercury	PCB-1260	D_PCB-1260	Benzene	D_Benzene	Ethylbenzene	D_Ethylbenzene	m,p-Xylene	D_m,p-Xylene	o-Xylene	D_o-Xylene	Total xylenes	D_Total xylenes	1-Methylnaphthalene
13NC28SS001	0.048	1	0.0074	0	0.0069	0	0.021	0	0.014	0	0.01	0	0.054	0	0.004
13NC28SS003[D]	0.21	1	0.32	1	0.032	1	1.3	1	5.2	1	2.7	1	7.9	1	41
13NC28SS004	0.08	1	0.0097	0	0.011	1	0.25	1	0.38	1	0.065	1	0.44	1	0.26
13NC28SS005	0.08	1	0.0093	0	0.01	0	0.031	0	0.021	0	0.016	0	0.037	0	0.082
13NC28SS006	0.24	1	0.15	1	0.028	0	0.28	1	1.1	1	0.6	1	1.7	1	57
13NC28SS007	0.092	1	0.019	1	0.0066	1	0.22	1	0.9	1	0.5	1	1.4	1	18
13NC28SS008	0.21	1	0.032	0	0.045	0	0.14	0	0.09	0	0.068	0	0.158	0	1.8
13NC28SS009	0.14	1	0.039	0	0.051	0	0.15	0	0.1	0	0.077	0	0.177	0	9.2
13NC28SS010	0.019	1	0.0082	0	0.0059	0	0.018	1	0.028	1	0.0088	0	0.029	1	2.1
13NC28SS011	0.078	1	0.061	1	0.018	0	0.23	1	0.29	1	0.16	1	0.45	1	5.2
13NC28SS012	0.12	1	0.023	0	0.028	0	0.085	0	0.057	0	0.043	0	0.1	1	3.5
13NC28SS013	0.14	1	0.24	1	0.016	0	0.047	0	0.031	0	0.023	0	0.054	0	66
13NC28SS014	0.19	1	0.057	1	0.067	0	0.2	1	0.38	1	0.1	0	0.48	1	50
13NC28SS016	0.077	1	0.097	1	0.014	0	0.042	0	0.016	1	0.021	0	0.037	1	7.6
13NC28SS017	0.17	1	0.035	0	0.048	0	0.14	0	0.096	0	0.072	0	0.168	0	14
13NC28SS018	0.062	1	0.013	0	0.011	0	0.034	0	0.023	0	0.017	0	0.04	0	2.2
13NC28SS019	0.1	1	0.08	1	0.03	0	0.09	0	0.036	1	0.045	0	0.081	1	8.1
13NC28SS020	0.12	1	0.031	1	0.029	0	0.086	0	0.058	0	0.043	0	0.101	0	3.9
13NC28SS021	0.082	1	0.099	1	0.04	0	0.12	0	0.12	1	0.067	1	0.187	1	1.5
13NC28SS022	0.021	0	0.013	0	0.0093	0	0.015	1	0.025	1	0.0099	1	0.034	1	1.6
13NC28SS023	0.077	1	0.033	0	0.043	0	0.26	1	0.82	1	0.3	1	1.12	1	56
13NC28SS024	0.057	1	0.023	0	0.026	0	0.059	1	0.14	1	0.039	0	0.179	1	18
13NC28SS025	0.081	1	0.021	0	0.05	0	0.2	1	0.2	1	0.076	1	0.276	1	0.11
13NC28SS026	0.024	1	0.0086	1	0.027	0	0.067	0	0.13	0	0.067	0	0.197	1	0.42
13NC28SS027	0.042	1	0.021	0	0.05	0	0.12	0	0.25	0	0.046	1	0.31	0	0.3
13NC28SS028	0.047	1	0.016	0	0.032	0	0.081	0	0.16	0	0.081	0	0.241	0	2.4
13NC28SS029	0.064	1	0.095	1	0.063	0	0.38	1	1.4QH	1	1.1	1	2.5	1	24
13NC28SS031[D]	0.058	1	0.021	1	0.16	0	0.17	1	0.37	1	0.42	1	0.79	1	12
13NC28SS032	0.045	1	0.025	1	0.12	0	0.69	1	2.1	1	1.7	1	3.8	1	11
13NC28SS033	0.049	1	0.17	1	0.086	0	1.5	1	6	1	4.2	1	10.2	1	35
13NC28SS034	0.077	1	0.18	1	0.018	0	0.027	1	0.11	1	0.11	1	0.22	1	24
13NC28SS035	0.03	1	0.023	0	0.073	0	0.15	1	0.58	1	0.4	1	0.98	1	0.46
13NC28SS036	0.12	1	0.61	1	0.58	0	4.7	1	17	1	11	1	28	1	78
13NC28SS037	0.065	1	0.085	1	0.58	0	1.5	0	2.9	0	1.5	0	4.4	0	5.4
13NC28SS038	0.089	1	0.29	1	0.12	0	0.24	1	0.83	1	0.61	1	1.44	1	19
13NC28SS040[D]	0.023	1	0.01	0	0.021	0	0.053	0	0.11	0	0.053	0	0.163	0	0.078
13NC28SS041	0.04	1	0.032	1	0.1	0	0.25	0	0.5	0	0.25	0	0.75	0	0.088
13NC28SS043[D]	0.039	1	0.012	0	0.032	0	0.081	0	0.16	0	0.081	0	0.241	0	0.035
13NC28SS044	0.047	1	0.24	1	0.051	0	0.13	0	0.26	0	0.13	0	0.39	0	0.073
13NC28SS045	0.041	1	0.016	0	0.046	0	0.12	0	0.23	0	0.12	0	0.35	0	0.081
13NC28SS046	0.047	1	0.01	0	0.022	0	0.055	0	0.11	0	0.055	0	0.165	0	0.021

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Statistical Input Data

Sample ID	D_1-Methylnaphthalene	2-Methylnaphthalene	D_2-Methylnaphthalene	Acenaphthene	D_Acenaphthene	Acenaphthylene	D_Acenaphthylene	Anthracene	D_Anthracene	Benzo[a]anthracene
13NC28SS001	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004
13NC28SS003[D]	1	66	1	1.6	1	1.6	1	0.0072	0	0.023
13NC28SS004	1	0.39	1	0.014	1	0.0093	1	0.0049	0	0.0049
13NC28SS005	1	0.063	1	0.011	1	0.0033	1	0.0047	0	0.0047
13NC28SS006	1	81	1	3.6	1	2.1	1	4.4	1	0.26
13NC28SS007	1	30	1	0.57	1	0.27	1	0.073	1	0.045
13NC28SS008	1	1.9	1	0.36	1	0.18	1	0.018	1	0.016
13NC28SS009	1	4.1	1	1.6	1	1.1	1	0.018	0	0.018
13NC28SS010	1	2.4	1	0.13	1	0.11	1	0.0041	0	0.0041
13NC28SS011	1	4.3	1	0.52	1	0.41	1	0.0085	0	0.0092
13NC28SS012	1	3.4	1	0.37	1	0.22	1	0.046	1	0.011
13NC28SS013	1	33	1	5.2	1	2.4	1	0.0078	0	0.074
13NC28SS014	1	53	1	2.3	1	2.2	1	0.36	1	0.034
13NC28SS016	1	11	1	0.34	1	0.21	1	0.036	1	0.0073
13NC28SS017	1	20	1	0.57	1	0.57	1	0.025	1	0.017
13NC28SS018	1	2	1	0.26	1	0.23	1	0.036	1	0.0051
13NC28SS019	1	9.6	1	0.31	1	0.17	1	0.021	1	0.013
13NC28SS020	1	3.9	1	0.014	0	0.014	0	0.014	0	0.017
13NC28SS021	1	2	1	0.62	1	0.5	1	0.053	1	0.016
13NC28SS022	1	1.9	1	0.054	1	0.079	1	0.0067	0	0.0067
13NC28SS023	1	86	1	0.59	1	0.38	1	0.097	1	0.015
13NC28SS024	1	29	1	0.47	1	0.25	1	0.031	1	0.012
13NC28SS025	1	0.15	1	0.021	1	0.017	1	0.021	1	0.013
13NC28SS026	1	0.41	1	0.0067	0	0.0067	0	0.0067	0	0.0067
13NC28SS027	1	0.41	1	0.096	1	0.064	1	0.037	1	0.024
13NC28SS028	1	3.4	1	0.8	1	0.0081	0	0.34	1	0.18
13NC28SS029	1	27	1	1.8	1	0.74	1	0.25	1	0.12
13NC28SS031[D]	1	18	1	0.66	1	0.3	1	0.081	1	0.061
13NC28SS032	1	17	1	0.64	1	0.26	1	0.054	1	0.054
13NC28SS033	1	43	1	0.81	1	0.68	1	0.25	1	0.091
13NC28SS034	1	29	1	0.97	1	0.92	1	0.23	1	0.17
13NC28SS035	1	0.56	1	0.042	1	0.029	1	0.012	1	0.0088
13NC28SS036	1	81	1	3.9	1	2.9	1	0.56	1	0.29
13NC28SS037	1	5.1	1	0.78	1	0.4	1	0.12	1	0.045
13NC28SS038	1	20	1	1	1	0.85	1	0.24	1	0.077
13NC28SS040[D]	1	0.093	1	0.015	1	0.012	1	0.0033	1	0.0048
13NC28SS041	1	0.094	1	0.013	1	0.0098	1	0.013	0	0.013
13NC28SS043[D]	1	0.04	1	0.026	1	0.03	1	0.14	1	0.1
13NC28SS044	1	0.052	1	0.029	1	0.069	1	0.049	0	0.049
13NC28SS045	1	0.066	1	0.043	0	0.043	0	0.043	0	0.043
13NC28SS046	1	0.027	0	0.027	0	0.069	1	0.027	0	0.027

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Statistical Input Data

Sample ID	D_Benzo[a]anthracene	Benzo[a]pyrene	D_Benzo[a]pyrene	Benzo[b]fluoranthene	D_Benzo[b]fluoranthene	Benzo[g,h,i]perylene	D_Benzo[g,h,i]perylene	Benzo[k]fluoranthene
13NC28SS001	0	0.004	0	0.004	0	0.004	0	0.004
13NC28SS003[D]	1	0.011	1	0.033	1	0.01	1	0.017
13NC28SS004	0	0.0049	0	0.0049	0	0.0049	0	0.0049
13NC28SS005	0	0.0047	0	0.0047	0	0.0047	0	0.0047
13NC28SS006	1	0.18	1	0.33	1	0.066	1	0.12
13NC28SS007	1	0.016	1	0.038	1	0.0071	1	0.013
13NC28SS008	0	0.016	0	0.016	0	0.016	0	0.016
13NC28SS009	1	0.018	0	0.021	1	0.018	0	0.018
13NC28SS010	0	0.0041	0	0.0041	0	0.0041	0	0.0041
13NC28SS011	1	0.0085	0	0.013	1	0.0085	0	0.0085
13NC28SS012	0	0.011	0	0.011	0	0.011	0	0.011
13NC28SS013	1	0.0078	0	0.084	1	0.0078	0	0.03
13NC28SS014	1	0.017	1	0.052	1	0.013	1	0.023
13NC28SS016	1	0.0079	0	0.012	1	0.0079	0	0.0081
13NC28SS017	0	0.017	0	0.017	0	0.017	0	0.014
13NC28SS018	1	0.004	1	0.0067	1	0.0063	0	0.006
13NC28SS019	0	0.013	0	0.009	1	0.013	0	0.013
13NC28SS020	1	0.014	0	0.016	1	0.014	0	0.013
13NC28SS021	0	0.016	0	0.028	1	0.016	0	0.019
13NC28SS022	0	0.0067	0	0.0067	0	0.0067	0	0.0067
13NC28SS023	1	0.016	0	0.069	1	0.016	0	0.025
13NC28SS024	0	0.012	0	0.015	1	0.012	0	0.0099
13NC28SS025	1	0.0063	1	0.026	1	0.01	0	0.0082
13NC28SS026	0	0.0067	0	0.0067	0	0.0067	0	0.0067
13NC28SS027	1	0.0087	1	0.027	1	0.01	0	0.0092
13NC28SS028	1	0.033	1	0.061	1	0.0081	0	0.021
13NC28SS029	1	0.028	1	0.057	1	0.005	0	0.026
13NC28SS031[D]	1	0.014	1	0.032	1	0.0071	0	0.01
13NC28SS032	1	0.014	1	0.029	1	0.0063	0	0.012
13NC28SS033	1	0.027	1	0.061	1	0.013	1	0.018
13NC28SS034	1	0.047	1	0.13	1	0.018	1	0.052
13NC28SS035	1	0.011	0	0.0092	1	0.011	0	0.011
13NC28SS036	1	0.12	1	0.29	1	0.073	1	0.077
13NC28SS037	1	0.021	1	0.047	1	0.0096	1	0.019
13NC28SS038	1	0.04	1	0.12	1	0.023	1	0.037
13NC28SS040[D]	1	0.0052	0	0.0052	0	0.0052	0	0.0052
13NC28SS041	0	0.013	0	0.013	0	0.013	0	0.013
13NC28SS043[D]	1	0.045	1	0.095	1	0.011	1	0.035
13NC28SS044	0	0.049	0	0.032	1	0.049	0	0.049
13NC28SS045	0	0.043	0	0.043	0	0.043	0	0.043
13NC28SS046	0	0.027	0	0.027	0	0.027	0	0.027

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Statistical Input Data

Sample ID	D_Benzo[k]fluoranthene	Chrysene	D_Chrysene	Dibenz(a,h)anthracene	D_Dibenz(a,h)anthracene	Fluoranthene	D_Fluoranthene	Fluorene	D_Fluorene	Indeno[1,2,3-cd]pyrene	D_Indeno[1,2,3-cd]pyrene
13NC28SS001	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0
13NC28SS003[D]	1	0.084	1	0.0082	1	0.2	1	3.4	1	0.0092	1
13NC28SS004	0	0.0036	1	0.0039	1	0.0049	0	0.032	1	0.0049	0
13NC28SS005	0	0.0047	0	0.0047	0	0.0038	1	0.028	1	0.0047	0
13NC28SS006	1	0.43	1	0.029	1	0.75	1	9	1	0.084	1
13NC28SS007	1	0.06	1	0.051	1	0.26	1	1.4	1	0.0096	1
13NC28SS008	0	0.022	1	0.016	0	0.023	1	0.61	1	0.016	0
13NC28SS009	0	0.06	1	0.012	1	0.064	1	3.5	1	0.018	0
13NC28SS010	0	0.0057	1	0.0041	0	0.013	1	0.23	1	0.0041	0
13NC28SS011	0	0.044	1	0.0085	0	0.059	1	1.2	1	0.0085	0
13NC28SS012	0	0.019	1	0.011	0	0.031	1	0.89	1	0.011	0
13NC28SS013	1	0.2	1	0.017	1	0.27	1	11	1	0.0078	0
13NC28SS014	1	0.084	1	0.019	0	0.019	0	7.9	1	0.014	1
13NC28SS016	1	0.038	1	0.0071	1	0.0079	0	0.92	1	0.0079	0
13NC28SS017	1	0.015	1	0.017	1	0.055	1	1	1	0.017	0
13NC28SS018	1	0.018	1	0.0057	1	0.023	1	0.75	1	0.0063	0
13NC28SS019	0	0.013	0	0.013	0	0.016	1	0.53	1	0.013	0
13NC28SS020	1	0.089	1	0.017	1	0.15	1	0.014	0	0.014	0
13NC28SS021	1	0.11	1	0.016	0	0.016	0	0.016	0	0.016	0
13NC28SS022	0	0.0067	0	0.0067	0	0.008	1	0.041	1	0.0067	0
13NC28SS023	1	0.22	1	0.016	0	0.052	1	0.45	1	0.016	0
13NC28SS024	1	0.053	1	0.012	0	0.056	1	0.87	1	0.012	0
13NC28SS025	1	0.024	1	0.01	0	0.093	1	0.041	1	0.01	1
13NC28SS026	0	0.0067	0	0.0067	0	0.0067	0	0.057	1	0.0041	1
13NC28SS027	1	0.057	1	0.01	0	0.35	1	0.23	1	0.01	1
13NC28SS028	1	0.16	1	0.0081	0	2.3	1	0.97	1	0.015	1
13NC28SS029	1	0.17	1	0.005	0	1	1	2.6	1	0.016	1
13NC28SS031[D]	1	0.076	1	0.0041	1	0.48	1	0.8	1	0.0083	1
13NC28SS032	1	0.063	1	0.0063	0	0.4	1	0.7	1	0.007	1
13NC28SS033	1	0.2	1	0.0051	0	0.93	1	2	1	0.017	1
13NC28SS034	1	0.25	1	0.0054	0	1.3	1	2.4	1	0.025	1
13NC28SS035	0	0.0072	1	0.011	0	0.043	1	0.059	1	0.011	0
13NC28SS036	1	0.76	1	0.026	1	1.6	1	11	1	0.059	1
13NC28SS037	1	0.059	1	0.014	0	0.27	1	1.2	1	0.018	1
13NC28SS038	1	0.21	1	0.0079	1	0.54	1	2.5	1	0.031	1
13NC28SS040[D]	0	0.0055	1	0.0052	0	0.022	1	0.029	1	0.0052	0
13NC28SS041	0	0.018	1	0.013	0	0.013	1	0.028	1	0.013	0
13NC28SS043[D]	1	0.16	1	0.0058	1	0.56	1	0.064	1	0.019	1
13NC28SS044	0	0.049	0	0.049	0	0.054	1	0.049	0	0.049	0
13NC28SS045	0	0.043	0	0.043	0	0.03	1	0.031	1	0.043	0
13NC28SS046	0	0.027	0	0.027	0	0.027	0	0.027	0	0.027	0

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Statistical Input Data

Sample ID	Naphthalene	D_Naphthalene	Phenanthrene	D_Phenanthrene	Pyrene	D_Pyrene	Total Organic Carbon - Quad	D_Total Organic Carbon - Quad	DRO nC10-<nC25	D_DRO nC10-<nC25	RRO nC25-nC36
13NC28SS001	0.004	0	0.0053	1	0.004	0	29000	1	42	1	500
13NC28SS003[D]	33	1	5	1	0.16	1	240000	1	24000	1	12000
13NC28SS004	0.27	1	0.024	1	0.0049	0	120000	1	380	1	3200
13NC28SS005	0.14	1	0.01	1	0.0047	0	65000	1	230	1	2400
13NC28SS006	25	1	3.7	1	0.89	1	250000	1	29000	1	10000
13NC28SS007	10	1	1.1	1	0.19	1	190000	1	11000	1	9600
13NC28SS008	1.6	1	0.24	1	0.02	1	280000	1	4200	1	7300
13NC28SS009	7.7	1	2.5	1	0.11	1	290000	1	66000	1	8500
13NC28SS010	1.4	1	0.19	1	0.0098	1	52000	1	11000	1	1800
13NC28SS011	4.2	1	1.2	1	0.061	1	170000	1	46000	1	9700
13NC28SS012	1	1	0.29	1	0.035	1	250000	1	13000	1	15000
13NC28SS013	12	1	4	1	0.24	1	270000	1	85000	1	19000
13NC28SS014	13	1	3.7	1	0.22	1	350000	1	67000	1	14000
13NC28SS016	2	1	0.4	1	0.049	1	88000	1	12000	1	6800
13NC28SS017	1.1	1	0.37	1	0.051	1	220000	1	21000	1	10000
13NC28SS018	0.27	1	0.49	1	0.041	1	76000	1	8200	1	4000
13NC28SS019	1.4	1	0.22	1	0.03	1	340000	1	8800	1	11000
13NC28SS020	2.3	1	0.29	1	0.19	1	270000	1	53000	1	8500
13NC28SS021	1.2	1	0.35	1	0.15	1	220000	1	41000	1	20000
13NC28SS022	1.2	1	0.023	1	0.0078	1	66000	1	2600	1	1000
13NC28SS023	40	1	0.56	1	0.24	1	330000	1	17000	1	26000
13NC28SS024	6.4	1	0.29	1	0.079	1	220000	1	3600	1	2500
13NC28SS025	0.075	1	0.09	1	0.075	1	210000	1	1600	1	6000
13NC28SS026	0.22	1	0.056	1	0.014	1	64000	1	8900	1	2200
13NC28SS027	0.64	1	0.88	1	0.27	1	140000	1	1100	1	1300
13NC28SS028	1.3	1	4.2	1	1.5	1	100000	1	4200	1	3300
13NC28SS029	9.7	1	3.5	1	0.69	1	140000	1	21000	1	6900
13NC28SS031[D]	4.2	1	0.98	1	0.33	1	140000	1	8500	1	4500
13NC28SS032	5.5	1	0.95	1	0.29	1	110000	1	4800	1	3400
13NC28SS033	24	1	3.9	1	0.69	1	81000	1	26000	1	7400
13NC28SS034	12	1	2.2	1	1	1	100000	1	26000	1	9800
13NC28SS035	0.34	1	0.052	1	0.049	1	120000	1	1000	1	830
13NC28SS036	24	1	6.3	1	1.3	1	230000	1	64000	1	22000
13NC28SS037	1.5	1	0.72	1	0.23	1	150000	1	16000	1	6400
13NC28SS038	7.2	1	1.4	1	0.52	1	130000	1	31000	1	11000
13NC28SS040[D]	0.029	1	0.02	1	0.017	1	34000	1	340	1	960
13NC28SS041	0.057	1	0.043	1	0.019	1	120000	1	540	1	1400
13NC28SS043[D]	0.054	1	0.38	1	0.56	1	74000	1	420	1	2200
13NC28SS044	0.078	1	0.12	1	0.12	1	200000	1	2900	1	6800
13NC28SS045	0.047	1	0.03	1	0.03	1	110000	1	780	1	3200
13NC28SS046	0.027	0	0.033	1	0.021	1	43000	1	2100	1	2800

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Statistical Input Data

Sample ID	D_RRO nC25-nC36	DRO nC10-<nC25-SG	D_DRO nC10-<nC25-SG	RRO nC25-nC36-SG	D_RRO nC25-nC36-SG
13NC28SS001	1	14	1	150	1
13NC28SS003[D]	1	18000	1	5900	1
13NC28SS004	1	210	1	1100	1
13NC28SS005	1	87	1	860	1
13NC28SS006	1	15000	1	3000	1
13NC28SS007	1	8000	1	3700	1
13NC28SS008	1	3300	1	3200	1
13NC28SS009	1	61000	1	4100	1
13NC28SS010	1	9200	1	630	1
13NC28SS011	1	39000	1	4600	1
13NC28SS012	1	9500	1	5300	1
13NC28SS013	1	75000	1	14000	1
13NC28SS014	1	54000	1	7800	1
13NC28SS016	1	9100	1	3600	1
13NC28SS017	1	15000	1	4800	1
13NC28SS018	1	6600	1	1900	1
13NC28SS019	1	7200	1	5100	1
13NC28SS020	1	40000	1	3400	1
13NC28SS021	1	33000	1	13000	1
13NC28SS022	1	2000	1	400	1
13NC28SS023	1	14000	1	18000	1
13NC28SS024	1	2900	1	1000	1
13NC28SS025	1	950	1	2200	1
13NC28SS026	1	8700	1	730	1
13NC28SS027	1	980	1	540	1
13NC28SS028	1	3700	1	930	1
13NC28SS029	1	23000	1	4500	1
13NC28SS031[D]	1	8000	1	1700	1
13NC28SS032	1	5300	1	1700	1
13NC28SS033	1	27000	1	4900	1
13NC28SS034	1	27000	1	7500	1
13NC28SS035	1	850	1	400	1
13NC28SS036	1	64000	1	17000	1
13NC28SS037	1	14000	1	4600	1
13NC28SS038	1	27000	1	6800	1
13NC28SS040[D]	1	270	1	320	1
13NC28SS041	1	410	1	580	1
13NC28SS043[D]	1	310	1	820	1
13NC28SS044	1	2500	1	3600	1
13NC28SS045	1	590	1	1100	1
13NC28SS046	1	1700	1	1500	1

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Carcinogenic Polycyclic Aromatic Hydrocarbon Data

Sample ID	1-Methylnaphthalene	BaP EQ	D_1-Methylnaphthalene	2-Methylnaphthalene	BaP EQ	D_2-Methylnaphthalene	Acenaphthene	BaP EQ	D_Acenaphthene
13NC28SS001	0.004	0	0	0.004	0	0	0.004	0	0
13NC28SS003[D]	41	0	1	66	0	1	1.6	0	1
13NC28SS004	0.26	0	1	0.39	0	1	0.014	0	1
13NC28SS005	0.082	0	1	0.063	0	1	0.011	0	1
13NC28SS006	57	0	1	81	0	1	3.6	0	1
13NC28SS007	18	0	1	30	0	1	0.57	0	1
13NC28SS008	1.8	0	1	1.9	0	1	0.36	0	1
13NC28SS009	9.2	0	1	4.1	0	1	1.6	0	1
13NC28SS010	2.1	0	1	2.4	0	1	0.13	0	1
13NC28SS011	5.2	0	1	4.3	0	1	0.52	0	1
13NC28SS012	3.5	0	1	3.4	0	1	0.37	0	1
13NC28SS013	66	0	1	33	0	1	5.2	0	1
13NC28SS014	50	0	1	53	0	1	2.3	0	1
13NC28SS016	7.6	0	1	11	0	1	0.34	0	1
13NC28SS017	14	0	1	20	0	1	0.57	0	1
13NC28SS018	2.2	0	1	2	0	1	0.26	0	1
13NC28SS019	8.1	0	1	9.6	0	1	0.31	0	1
13NC28SS020	3.9	0	1	3.9	0	1	0.014	0	0
13NC28SS021	1.5	0	1	2	0	1	0.62	0	1
13NC28SS022	1.6	0	1	1.9	0	1	0.054	0	1
13NC28SS023	56	0	1	86	0	1	0.59	0	1
13NC28SS024	18	0	1	29	0	1	0.47	0	1
13NC28SS025	0.11	0	1	0.15	0	1	0.021	0	1
13NC28SS026	0.42	0	1	0.41	0	1	0.0067	0	0
13NC28SS027	0.3	0	1	0.41	0	1	0.096	0	1
13NC28SS028	2.4	0	1	3.4	0	1	0.8	0	1
13NC28SS029	24	0	1	27	0	1	1.8	0	1
13NC28SS031[D]	12	0	1	18	0	1	0.66	0	1
13NC28SS032	11	0	1	17	0	1	0.64	0	1
13NC28SS033	35	0	1	43	0	1	0.81	0	1
13NC28SS034	24	0	1	29	0	1	0.97	0	1
13NC28SS035	0.46	0	1	0.56	0	1	0.042	0	1
13NC28SS036	78	0	1	81	0	1	3.9	0	1
13NC28SS037	5.4	0	1	5.1	0	1	0.78	0	1
13NC28SS038	19	0	1	20	0	1	1	0	1
13NC28SS040[D]	0.078	0	1	0.093	0	1	0.015	0	1
13NC28SS041	0.088	0	1	0.094	0	1	0.013	0	1
13NC28SS043[D]	0.035	0	1	0.04	0	1	0.026	0	1
13NC28SS044	0.073	0	1	0.052	0	1	0.029	0	1
13NC28SS045	0.081	0	1	0.066	0	1	0.043	0	0
13NC28SS046	0.021	0	1	0.027	0	0	0.027	0	0

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Sample ID	Acenaphthylene	BaP EQ	D_Acenaphthylene	Anthracene	BaP EQ	D_Anthracene	Benzo[a]anthracene	BaP EQ	D_Benzo[a]anthracene	Benzo[a]pyrene	BaP EQ
13NC28SS001	0.004	0	0	0.004	0	0	0.004	0.0008	0	0.004	0.004
13NC28SS003[D]	1.6	0	1	0.0072	0	0	0.023	0.0046	1	0.011	0.011
13NC28SS004	0.0093	0	1	0.0049	0	0	0.0049	0.00098	0	0.0049	0.0049
13NC28SS005	0.0033	0	1	0.0047	0	0	0.0047	0.00094	0	0.0047	0.0047
13NC28SS006	2.1	0	1	4.4	0	1	0.26	0.052	1	0.18	0.18
13NC28SS007	0.27	0	1	0.073	0	1	0.045	0.009	1	0.016	0.016
13NC28SS008	0.18	0	1	0.018	0	1	0.016	0.0032	0	0.016	0.016
13NC28SS009	1.1	0	1	0.018	0	0	0.018	0.0036	1	0.018	0.018
13NC28SS010	0.11	0	1	0.0041	0	0	0.0041	0.00082	0	0.0041	0.0041
13NC28SS011	0.41	0	1	0.0085	0	0	0.0092	0.00184	1	0.0085	0.0085
13NC28SS012	0.22	0	1	0.046	0	1	0.011	0.0022	0	0.011	0.011
13NC28SS013	2.4	0	1	0.0078	0	0	0.074	0.0148	1	0.0078	0.0078
13NC28SS014	2.2	0	1	0.36	0	1	0.034	0.0068	1	0.017	0.017
13NC28SS016	0.21	0	1	0.036	0	1	0.0073	0.00146	1	0.0079	0.0079
13NC28SS017	0.57	0	1	0.025	0	1	0.017	0.0034	0	0.017	0.017
13NC28SS018	0.23	0	1	0.036	0	1	0.0051	0.00102	1	0.004	0.004
13NC28SS019	0.17	0	1	0.021	0	1	0.013	0.0026	0	0.013	0.013
13NC28SS020	0.014	0	0	0.014	0	0	0.017	0.0034	1	0.014	0.014
13NC28SS021	0.5	0	1	0.053	0	1	0.016	0.0032	0	0.016	0.016
13NC28SS022	0.079	0	1	0.0067	0	0	0.0067	0.00134	0	0.0067	0.0067
13NC28SS023	0.38	0	1	0.097	0	1	0.015	0.003	1	0.016	0.016
13NC28SS024	0.25	0	1	0.031	0	1	0.012	0.0024	0	0.012	0.012
13NC28SS025	0.017	0	1	0.021	0	1	0.013	0.0026	1	0.0063	0.0063
13NC28SS026	0.0067	0	0	0.0067	0	0	0.0067	0.00134	0	0.0067	0.0067
13NC28SS027	0.064	0	1	0.037	0	1	0.024	0.0048	1	0.0087	0.0087
13NC28SS028	0.0081	0	0	0.34	0	1	0.18	0.036	1	0.033	0.033
13NC28SS029	0.74	0	1	0.25	0	1	0.12	0.024	1	0.028	0.028
13NC28SS031[D]	0.3	0	1	0.081	0	1	0.061	0.0122	1	0.014	0.014
13NC28SS032	0.26	0	1	0.054	0	1	0.054	0.0108	1	0.014	0.014
13NC28SS033	0.68	0	1	0.25	0	1	0.091	0.0182	1	0.027	0.027
13NC28SS034	0.92	0	1	0.23	0	1	0.17	0.034	1	0.047	0.047
13NC28SS035	0.029	0	1	0.012	0	1	0.0088	0.00176	1	0.011	0.011
13NC28SS036	2.9	0	1	0.56	0	1	0.29	0.058	1	0.12	0.12
13NC28SS037	0.4	0	1	0.12	0	1	0.045	0.009	1	0.021	0.021
13NC28SS038	0.85	0	1	0.24	0	1	0.077	0.0154	1	0.04	0.04
13NC28SS040[D]	0.012	0	1	0.0033	0	1	0.0048	0.00096	1	0.0052	0.0052
13NC28SS041	0.0098	0	1	0.013	0	0	0.013	0.0026	0	0.013	0.013
13NC28SS043[D]	0.03	0	1	0.14	0	1	0.1	0.02	1	0.045	0.045
13NC28SS044	0.069	0	1	0.049	0	0	0.049	0.0098	0	0.049	0.049
13NC28SS045	0.043	0	0	0.043	0	0	0.043	0.0086	0	0.043	0.043
13NC28SS046	0.069	0	1	0.027	0	0	0.027	0.0054	0	0.027	0.027

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Sample ID	D_Benzo[a]pyrene	Benzo[b]fluoranthene	BaP EQ	D_Benzo[b]fluoranthene	Benzo[g,h,i]perylene	BaP EQ	D_Benzo[g,h,i]perylene	Benzo[k]fluoranthene
13NC28SS001	0	0.004	0.0032	0	0.004	0.000036	0	0.004
13NC28SS003[D]	1	0.033	0.0264	1	0.01	0.00009	1	0.017
13NC28SS004	0	0.0049	0.00392	0	0.0049	0.0000441	0	0.0049
13NC28SS005	0	0.0047	0.00376	0	0.0047	0.0000423	0	0.0047
13NC28SS006	1	0.33	0.264	1	0.066	0.000594	1	0.12
13NC28SS007	1	0.038	0.0304	1	0.0071	0.0000639	1	0.013
13NC28SS008	0	0.016	0.0128	0	0.016	0.000144	0	0.016
13NC28SS009	0	0.021	0.0168	1	0.018	0.000162	0	0.018
13NC28SS010	0	0.0041	0.00328	0	0.0041	0.0000369	0	0.0041
13NC28SS011	0	0.013	0.0104	1	0.0085	0.0000765	0	0.0085
13NC28SS012	0	0.011	0.0088	0	0.011	0.000099	0	0.011
13NC28SS013	0	0.084	0.0672	1	0.0078	0.0000702	0	0.03
13NC28SS014	1	0.052	0.0416	1	0.013	0.000117	1	0.023
13NC28SS016	0	0.012	0.0096	1	0.0079	0.0000711	0	0.0081
13NC28SS017	0	0.017	0.0136	0	0.017	0.000153	0	0.014
13NC28SS018	1	0.0067	0.00536	1	0.0063	0.0000567	0	0.006
13NC28SS019	0	0.009	0.0072	1	0.013	0.000117	0	0.013
13NC28SS020	0	0.016	0.0128	1	0.014	0.000126	0	0.013
13NC28SS021	0	0.028	0.0224	1	0.016	0.000144	0	0.019
13NC28SS022	0	0.0067	0.00536	0	0.0067	0.0000603	0	0.0067
13NC28SS023	0	0.069	0.0552	1	0.016	0.000144	0	0.025
13NC28SS024	0	0.015	0.012	1	0.012	0.000108	0	0.0099
13NC28SS025	1	0.026	0.0208	1	0.01	0.00009	0	0.0082
13NC28SS026	0	0.0067	0.00536	0	0.0067	0.0000603	0	0.0067
13NC28SS027	1	0.027	0.0216	1	0.01	0.00009	0	0.0092
13NC28SS028	1	0.061	0.0488	1	0.0081	0.0000729	0	0.021
13NC28SS029	1	0.057	0.0456	1	0.005	0.000045	0	0.026
13NC28SS031[D]	1	0.032	0.0256	1	0.0071	0.0000639	0	0.01
13NC28SS032	1	0.029	0.0232	1	0.0063	0.0000567	0	0.012
13NC28SS033	1	0.061	0.0488	1	0.013	0.000117	1	0.018
13NC28SS034	1	0.13	0.104	1	0.018	0.000162	1	0.052
13NC28SS035	0	0.0092	0.00736	1	0.011	0.000099	0	0.011
13NC28SS036	1	0.29	0.232	1	0.073	0.000657	1	0.077
13NC28SS037	1	0.047	0.0376	1	0.0096	0.0000864	1	0.019
13NC28SS038	1	0.12	0.096	1	0.023	0.000207	1	0.037
13NC28SS040[D]	0	0.0052	0.00416	0	0.0052	0.0000468	0	0.0052
13NC28SS041	0	0.013	0.0104	0	0.013	0.000117	0	0.013
13NC28SS043[D]	1	0.095	0.076	1	0.011	0.000099	1	0.035
13NC28SS044	0	0.032	0.0256	1	0.049	0.000441	0	0.049
13NC28SS045	0	0.043	0.0344	0	0.043	0.000387	0	0.043
13NC28SS046	0	0.027	0.0216	0	0.027	0.000243	0	0.027

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Sample ID	BaP EQ	D_Benzo[k]fluoranthene	Chrysene	BaP EQ	D_Chrysene	Dibenz(a,h)anthracene	BaP EQ	D_Dibenz(a,h)anthracene	Fluoranthene	BaP EQ	D_Fluoranthene
13NC28SS001	0.00012	0	0.004	0.0004	0	0.004	0.04	0	0.004	0.00032	0
13NC28SS003[D]	0.00051	1	0.084	0.0084	1	0.0082	0.082	1	0.2	0.016	1
13NC28SS004	0.000147	0	0.0036	0.00036	1	0.0039	0.039	1	0.0049	0.000392	0
13NC28SS005	0.000141	0	0.0047	0.00047	0	0.0047	0.047	0	0.0038	0.000304	1
13NC28SS006	0.0036	1	0.43	0.043	1	0.029	0.29	1	0.75	0.06	1
13NC28SS007	0.00039	1	0.06	0.006	1	0.051	0.51	1	0.26	0.0208	1
13NC28SS008	0.00048	0	0.022	0.0022	1	0.016	0.16	0	0.023	0.00184	1
13NC28SS009	0.00054	0	0.06	0.006	1	0.012	0.12	1	0.064	0.00512	1
13NC28SS010	0.000123	0	0.0057	0.00057	1	0.0041	0.041	0	0.013	0.00104	1
13NC28SS011	0.000255	0	0.044	0.0044	1	0.0085	0.085	0	0.059	0.00472	1
13NC28SS012	0.00033	0	0.019	0.0019	1	0.011	0.11	0	0.031	0.00248	1
13NC28SS013	0.0009	1	0.2	0.02	1	0.017	0.17	1	0.27	0.0216	1
13NC28SS014	0.00069	1	0.084	0.0084	1	0.019	0.19	0	0.019	0.00152	0
13NC28SS016	0.000243	1	0.038	0.0038	1	0.0071	0.071	1	0.0079	0.000632	0
13NC28SS017	0.00042	1	0.015	0.0015	1	0.017	0.17	1	0.055	0.0044	1
13NC28SS018	0.00018	1	0.018	0.0018	1	0.0057	0.057	1	0.023	0.00184	1
13NC28SS019	0.00039	0	0.013	0.0013	0	0.013	0.13	0	0.016	0.00128	1
13NC28SS020	0.00039	1	0.089	0.0089	1	0.017	0.17	1	0.15	0.012	1
13NC28SS021	0.00057	1	0.11	0.011	1	0.016	0.16	0	0.016	0.00128	0
13NC28SS022	0.000201	0	0.0067	0.00067	0	0.0067	0.067	0	0.008	0.00064	1
13NC28SS023	0.00075	1	0.22	0.022	1	0.016	0.16	0	0.052	0.00416	1
13NC28SS024	0.000297	1	0.053	0.0053	1	0.012	0.12	0	0.056	0.00448	1
13NC28SS025	0.000246	1	0.024	0.0024	1	0.01	0.1	0	0.093	0.00744	1
13NC28SS026	0.000201	0	0.0067	0.00067	0	0.0067	0.067	0	0.0067	0.000536	0
13NC28SS027	0.000276	1	0.057	0.0057	1	0.01	0.1	0	0.35	0.028	1
13NC28SS028	0.00063	1	0.16	0.016	1	0.0081	0.081	0	2.3	0.184	1
13NC28SS029	0.00078	1	0.17	0.017	1	0.005	0.05	0	1	0.08	1
13NC28SS031[D]	0.0003	1	0.076	0.0076	1	0.0041	0.041	1	0.48	0.0384	1
13NC28SS032	0.00036	1	0.063	0.0063	1	0.0063	0.063	0	0.4	0.032	1
13NC28SS033	0.00054	1	0.2	0.02	1	0.0051	0.051	0	0.93	0.0744	1
13NC28SS034	0.00156	1	0.25	0.025	1	0.0054	0.054	0	1.3	0.104	1
13NC28SS035	0.00033	0	0.0072	0.00072	1	0.011	0.11	0	0.043	0.00344	1
13NC28SS036	0.00231	1	0.76	0.076	1	0.026	0.26	1	1.6	0.128	1
13NC28SS037	0.00057	1	0.059	0.0059	1	0.014	0.14	0	0.27	0.0216	1
13NC28SS038	0.00111	1	0.21	0.021	1	0.0079	0.079	1	0.54	0.0432	1
13NC28SS040[D]	0.000156	0	0.0055	0.00055	1	0.0052	0.052	0	0.022	0.00176	1
13NC28SS041	0.00039	0	0.018	0.0018	1	0.013	0.13	0	0.013	0.00104	1
13NC28SS043[D]	0.00105	1	0.16	0.016	1	0.0058	0.058	1	0.56	0.0448	1
13NC28SS044	0.00147	0	0.049	0.0049	0	0.049	0.49	0	0.054	0.00432	1
13NC28SS045	0.00129	0	0.043	0.0043	0	0.043	0.43	0	0.03	0.0024	1
13NC28SS046	0.00081	0	0.027	0.0027	0	0.027	0.27	0	0.027	0.00216	0

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Sample ID	Fluorene	BaP EQ	D_Fluorene	Indeno[1,2,3-cd]pyrene	BaP EQ	D_Indeno[1,2,3-cd]pyrene	Naphthalene	BaP EQ	D_Naphthalene	Phenanthrene	BaP EQ	D_Phenanthrene
13NC28SS001	0.004	0	0	0.004	0.00028	0	0.004	0	0	0.0053	0	1
13NC28SS003[D]	3.4	0	1	0.0092	0.000644	1	33	0	1	5	0	1
13NC28SS004	0.032	0	1	0.0049	0.000343	0	0.27	0	1	0.024	0	1
13NC28SS005	0.028	0	1	0.0047	0.000329	0	0.14	0	1	0.01	0	1
13NC28SS006	9	0	1	0.084	0.00588	1	25	0	1	3.7	0	1
13NC28SS007	1.4	0	1	0.0096	0.000672	1	10	0	1	1.1	0	1
13NC28SS008	0.61	0	1	0.016	0.00112	0	1.6	0	1	0.24	0	1
13NC28SS009	3.5	0	1	0.018	0.00126	0	7.7	0	1	2.5	0	1
13NC28SS010	0.23	0	1	0.0041	0.000287	0	1.4	0	1	0.19	0	1
13NC28SS011	1.2	0	1	0.0085	0.000595	0	4.2	0	1	1.2	0	1
13NC28SS012	0.89	0	1	0.011	0.00077	0	1	0	1	0.29	0	1
13NC28SS013	11	0	1	0.0078	0.000546	0	12	0	1	4	0	1
13NC28SS014	7.9	0	1	0.014	0.00098	1	13	0	1	3.7	0	1
13NC28SS016	0.92	0	1	0.0079	0.000553	0	2	0	1	0.4	0	1
13NC28SS017	1	0	1	0.017	0.00119	0	1.1	0	1	0.37	0	1
13NC28SS018	0.75	0	1	0.0063	0.000441	0	0.27	0	1	0.49	0	1
13NC28SS019	0.53	0	1	0.013	0.00091	0	1.4	0	1	0.22	0	1
13NC28SS020	0.014	0	0	0.014	0.00098	0	2.3	0	1	0.29	0	1
13NC28SS021	0.016	0	0	0.016	0.00112	0	1.2	0	1	0.35	0	1
13NC28SS022	0.041	0	1	0.0067	0.000469	0	1.2	0	1	0.023	0	1
13NC28SS023	0.45	0	1	0.016	0.00112	0	40	0	1	0.56	0	1
13NC28SS024	0.87	0	1	0.012	0.00084	0	6.4	0	1	0.29	0	1
13NC28SS025	0.041	0	1	0.01	0.0007	1	0.075	0	1	0.09	0	1
13NC28SS026	0.057	0	1	0.0041	0.000287	1	0.22	0	1	0.056	0	1
13NC28SS027	0.23	0	1	0.01	0.0007	1	0.64	0	1	0.88	0	1
13NC28SS028	0.97	0	1	0.015	0.00105	1	1.3	0	1	4.2	0	1
13NC28SS029	2.6	0	1	0.016	0.00112	1	9.7	0	1	3.5	0	1
13NC28SS031[D]	0.8	0	1	0.0083	0.000581	1	4.2	0	1	0.98	0	1
13NC28SS032	0.7	0	1	0.007	0.00049	1	5.5	0	1	0.95	0	1
13NC28SS033	2	0	1	0.017	0.00119	1	24	0	1	3.9	0	1
13NC28SS034	2.4	0	1	0.025	0.00175	1	12	0	1	2.2	0	1
13NC28SS035	0.059	0	1	0.011	0.00077	0	0.34	0	1	0.052	0	1
13NC28SS036	11	0	1	0.059	0.00413	1	24	0	1	6.3	0	1
13NC28SS037	1.2	0	1	0.018	0.00126	1	1.5	0	1	0.72	0	1
13NC28SS038	2.5	0	1	0.031	0.00217	1	7.2	0	1	1.4	0	1
13NC28SS040[D]	0.029	0	1	0.0052	0.000364	0	0.029	0	1	0.02	0	1
13NC28SS041	0.028	0	1	0.013	0.00091	0	0.057	0	1	0.043	0	1
13NC28SS043[D]	0.064	0	1	0.019	0.00133	1	0.054	0	1	0.38	0	1
13NC28SS044	0.049	0	0	0.049	0.00343	0	0.078	0	1	0.12	0	1
13NC28SS045	0.031	0	1	0.043	0.00301	0	0.047	0	1	0.03	0	1
13NC28SS046	0.027	0	0	0.027	0.00189	0	0.027	0	0	0.033	0	1

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Sample ID	Pyrene	BaP EQ	D_Pyrene	CPAH	D_CPAH
13NC28SS001	0.004	0	0	0.049156	1
13NC28SS003[D]	0.16	0	1	0.149644	1
13NC28SS004	0.0049	0	0	0.050086	1
13NC28SS005	0.0047	0	0	0.057686	1
13NC28SS006	0.89	0	1	0.899074	1
13NC28SS007	0.19	0	1	0.593326	1
13NC28SS008	0.02	0	1	0.197784	1
13NC28SS009	0.11	0	1	0.171482	1
13NC28SS010	0.0098	0	1	0.051257	1
13NC28SS011	0.061	0	1	0.115787	1
13NC28SS012	0.035	0	1	0.137579	1
13NC28SS013	0.24	0	1	0.302916	1
13NC28SS014	0.22	0	1	0.267107	1
13NC28SS016	0.049	0	1	0.095259	1
13NC28SS017	0.051	0	1	0.211663	1
13NC28SS018	0.041	0	1	0.071698	1
13NC28SS019	0.03	0	1	0.156797	1
13NC28SS020	0.19	0	1	0.222596	1
13NC28SS021	0.15	0	1	0.215714	1
13NC28SS022	0.0078	0	1	0.08244	1
13NC28SS023	0.24	0	1	0.262374	1
13NC28SS024	0.079	0	1	0.157425	1
13NC28SS025	0.075	0	1	0.140576	1
13NC28SS026	0.014	0	1	0.082154	1
13NC28SS027	0.27	0	1	0.169866	1
13NC28SS028	1.5	0	1	0.400553	1
13NC28SS029	0.69	0	1	0.246545	1
13NC28SS031[D]	0.33	0	1	0.139745	1
13NC28SS032	0.29	0	1	0.150207	1
13NC28SS033	0.69	0	1	0.241247	1
13NC28SS034	1	0	1	0.371472	1
13NC28SS035	0.049	0	1	0.135479	1
13NC28SS036	1.3	0	1	0.881097	1
13NC28SS037	0.23	0	1	0.237016	1
13NC28SS038	0.52	0	1	0.298087	1
13NC28SS040[D]	0.017	0	1	0.065197	1
13NC28SS041	0.019	0	1	0.160257	1
13NC28SS043[D]	0.56	0	1	0.262279	1
13NC28SS044	0.12	0	1	0.588961	1
13NC28SS045	0.03	0	1	0.527387	1
13NC28SS046	0.021	0	1	0.331803	1

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Pro-UCL Output Data

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	7/1/2015 12:40
From File	NE Cape Site 28.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic

General Statistics

Total Number of Observations	41	Number of Distinct Observations	35
		Number of Missing Observations	0
Minimum	4.6	Mean	17.96
Maximum	88	Median	11
SD	18.48	Std. Error of Mean	2.886
Coefficient of Variation	1.029	Skewness	2.283

Normal GOF Test

Shapiro Wilk Test Statistic	0.692	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.271	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	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	22.82	95% Adjusted-CLT UCL (Chen-1995)	23.81
		95% Modified-t UCL (Johnson-1978)	22.99

Gamma GOF Test			
A-D Test Statistic	2.161	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.765	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.196	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.14	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.602	k star (bias corrected MLE)	1.501
Theta hat (MLE)	11.21	Theta star (bias corrected MLE)	11.97
nu hat (MLE)	131.4	nu star (bias corrected)	123.1
MLE Mean (bias corrected)	17.96	MLE Sd (bias corrected)	14.66
		Approximate Chi Square Value (0.05)	98.46
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	97.66
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	22.46	95% Adjusted Gamma UCL (use when n<50)	22.64
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.909	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.134	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.526	Mean of logged Data	2.545
Maximum of Logged Data	4.477	SD of logged Data	0.774
Assuming Lognormal Distribution			
95% H-UCL	22.28	90% Chebyshev (MVUE) UCL	23.86
95% Chebyshev (MVUE) UCL	26.96	97.5% Chebyshev (MVUE) UCL	31.26

99% Chebyshev (MVUE) UCL	39.7

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	22.71	95% Jackknife UCL	22.82
95% Standard Bootstrap UCL	22.68	95% Bootstrap-t UCL	24.74
95% Hall's Bootstrap UCL	24.4	95% Percentile Bootstrap UCL	22.81
95% BCA Bootstrap UCL	23.61		
90% Chebyshev(Mean, Sd) UCL	26.62	95% Chebyshev(Mean, Sd) UCL	30.54
97.5% Chebyshev(Mean, Sd) UCL	35.99	99% Chebyshev(Mean, Sd) UCL	46.68

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	30.54

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.

Barium

General Statistics

Total Number of Observations	41	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	27	Mean	103.4
Maximum	160	Median	110
SD	31.83	Std. Error of Mean	4.972
Coefficient of Variation	0.308	Skewness	-0.319

Normal GOF Test			
Shapiro Wilk Test Statistic	0.959	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.1	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	111.7	95% Adjusted-CLT UCL (Chen-1995)	111.3
		95% Modified-t UCL (Johnson-1978)	111.7
Gamma GOF Test			
A-D Test Statistic	1.145	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.137	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.138	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	8.622	k star (bias corrected MLE)	8.007
Theta hat (MLE)	11.99	Theta star (bias corrected MLE)	12.91
nu hat (MLE)	707	nu star (bias corrected)	656.6
MLE Mean (bias corrected)	103.4	MLE Sd (bias corrected)	36.53
		Approximate Chi Square Value (0.05)	598.1
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	596.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	113.5	95% Adjusted Gamma UCL (use when n<50)	113.9
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.877	Shapiro Wilk Lognormal GOF Test	

5% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.296	Mean of logged Data	4.579
Maximum of Logged Data	5.075	SD of logged Data	0.377
Assuming Lognormal Distribution			
95% H-UCL	116.5	90% Chebyshev (MVUE) UCL	123.3
95% Chebyshev (MVUE) UCL	131.9	97.5% Chebyshev (MVUE) UCL	143.8
99% Chebyshev (MVUE) UCL	167.2		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	111.5	95% Jackknife UCL	111.7
95% Standard Bootstrap UCL	111.5	95% Bootstrap-t UCL	111.2
95% Hall's Bootstrap UCL	111.9	95% Percentile Bootstrap UCL	111.1
95% BCA Bootstrap UCL	110.7		
90% Chebyshev(Mean, Sd) UCL	118.3	95% Chebyshev(Mean, Sd) UCL	125
97.5% Chebyshev(Mean, Sd) UCL	134.4	99% Chebyshev(Mean, Sd) UCL	152.8
Suggested UCL to Use			
95% Student's-t UCL	111.7		

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.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Cadmium

General Statistics

Total Number of Observations	41	Number of Distinct Observations	33
Number of Detects	39	Number of Non-Detects	2
Number of Distinct Detects	32	Number of Distinct Non-Detects	2
Minimum Detect	0.025	Minimum Non-Detect	0.069
Maximum Detect	0.77	Maximum Non-Detect	0.091
Variance Detects	0.038	Percent Non-Detects	4.88%
Mean Detects	0.3	SD Detects	0.195
Median Detects	0.24	CV Detects	0.65
Skewness Detects	0.83	Kurtosis Detects	0.169
Mean of Logged Detects	-1.465	SD of Logged Detects	0.821

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.923	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.134	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.142	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	0.287	Standard Error of Mean	0.031
SD	0.196	95% KM (BCA) UCL	0.334
95% KM (t) UCL	0.34	95% KM (Percentile Bootstrap) UCL	0.34
95% KM (z) UCL	0.338	95% KM Bootstrap t UCL	0.345
90% KM Chebyshev UCL	0.38	95% KM Chebyshev UCL	0.422
97.5% KM Chebyshev UCL	0.481	99% KM Chebyshev UCL	0.596

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.364	Anderson-Darling GOF Test	
5% A-D Critical Value	0.759	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.119	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.143	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)	2.071	k star (bias corrected MLE)	1.928
Theta hat (MLE)	0.145	Theta star (bias corrected MLE)	0.156
nu hat (MLE)	161.5	nu star (bias corrected)	150.4
MLE Mean (bias corrected)	0.3	MLE Sd (bias corrected)	0.216

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	2.153	nu hat (KM)	176.5
Approximate Chi Square Value (176.53, α)	146.8	Adjusted Chi Square Value (176.53, β)	145.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.346	95% Gamma Adjusted KM-UCL (use when n<50)	0.348

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	0.025	Mean	0.288
Maximum	0.77	Median	0.24
SD	0.197	CV	0.685
k hat (MLE)	1.868	k star (bias corrected MLE)	1.748
Theta hat (MLE)	0.154	Theta star (bias corrected MLE)	0.165
nu hat (MLE)	153.2	nu star (bias corrected)	143.3
MLE Mean (bias corrected)	0.288	MLE Sd (bias corrected)	0.218
		Adjusted Level of Significance (β)	0.0441

Approximate Chi Square Value (143.31, α)	116.6	Adjusted Chi Square Value (143.31, β)	115.8
95% Gamma Approximate UCL (use when n>=50)	0.354	95% Gamma Adjusted UCL (use when n<50)	0.357

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.925	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.168	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.142	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	0.288	Mean in Log Scale	-1.531
SD in Original Scale	0.197	SD in Log Scale	0.854
95% t UCL (assumes normality of ROS data)	0.34	95% Percentile Bootstrap UCL	0.34
95% BCA Bootstrap UCL	0.344	95% Bootstrap t UCL	0.343
95% H-UCL (Log ROS)	0.419		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.287	Mean in Log Scale	-1.551
SD in Original Scale	0.198	SD in Log Scale	0.889
95% t UCL (Assumes normality)	0.339	95% H-Stat UCL	0.431

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	0.34	95% KM (Percentile Bootstrap) UCL	0.34

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.

Chromium

General Statistics

Total Number of Observations	41	Number of Distinct Observations	23
		Number of Missing Observations	0
Minimum	4.2	Mean	16.2
Maximum	32	Median	16
SD	6.937	Std. Error of Mean	1.083
Coefficient of Variation	0.428	Skewness	0.482

Normal GOF Test

Shapiro Wilk Test Statistic	0.958	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0903	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	18.02	95% Adjusted-CLT UCL (Chen-1995)	18.07
		95% Modified-t UCL (Johnson-1978)	18.04

Gamma GOF Test

A-D Test Statistic	0.287	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0999	Kolmogrov-Smirnoff Gamma GOF Test
5% K-S Critical Value	0.138	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	5.171	k star (bias corrected MLE)	4.809
Theta hat (MLE)	3.133	Theta star (bias corrected MLE)	3.368
nu hat (MLE)	424.1	nu star (bias corrected)	394.4
MLE Mean (bias corrected)	16.2	MLE Sd (bias corrected)	7.387
		Approximate Chi Square Value (0.05)	349.3
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	347.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	18.29	95% Adjusted Gamma UCL (use when n<50)	18.37
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.957	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.129	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.435	Mean of logged Data	2.685
Maximum of Logged Data	3.466	SD of logged Data	0.474
Assuming Lognormal Distribution			
95% H-UCL	18.89	90% Chebyshev (MVUE) UCL	20.15
95% Chebyshev (MVUE) UCL	21.87	97.5% Chebyshev (MVUE) UCL	24.25
99% Chebyshev (MVUE) UCL	28.94		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			

95% CLT UCL	17.98	95% Jackknife UCL	18.02
95% Standard Bootstrap UCL	17.93	95% Bootstrap-t UCL	18.1
95% Hall's Bootstrap UCL	18.1	95% Percentile Bootstrap UCL	18.06
95% BCA Bootstrap UCL	17.98		
90% Chebyshev(Mean, Sd) UCL	19.45	95% Chebyshev(Mean, Sd) UCL	20.92
97.5% Chebyshev(Mean, Sd) UCL	22.97	99% Chebyshev(Mean, Sd) UCL	26.98

Suggested UCL to Use
95% Student's-t UCL 18.02

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.

Lead

General Statistics

Total Number of Observations	41	Number of Distinct Observations	31
		Number of Missing Observations	0
Minimum	3.4	Mean	16.98
Maximum	64	Median	14
SD	11.64	Std. Error of Mean	1.817
Coefficient of Variation	0.685	Skewness	2.045

Normal GOF Test

Shapiro Wilk Test Statistic	0.815	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.177	Lilliefors GOF Test
5% Lilliefors Critical Value	0.138	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	20.04	95% Adjusted-CLT UCL (Chen-1995)	20.59
		95% Modified-t UCL (Johnson-1978)	20.14
Gamma GOF Test			
A-D Test Statistic	0.655	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.113	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.139	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.901	k star (bias corrected MLE)	2.705
Theta hat (MLE)	5.855	Theta star (bias corrected MLE)	6.279
nu hat (MLE)	237.9	nu star (bias corrected)	221.8
MLE Mean (bias corrected)	16.98	MLE Sd (bias corrected)	10.33
		Approximate Chi Square Value (0.05)	188.3
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	187.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	20	95% Adjusted Gamma UCL (use when n<50)	20.12
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.985	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.078	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			

Minimum of Logged Data	1.224	Mean of logged Data	2.65
Maximum of Logged Data	4.159	SD of logged Data	0.598

Assuming Lognormal Distribution

95% H-UCL	20.39	90% Chebyshev (MVUE) UCL	21.88
95% Chebyshev (MVUE) UCL	24.16	97.5% Chebyshev (MVUE) UCL	27.32
99% Chebyshev (MVUE) UCL	33.55		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	19.97	95% Jackknife UCL	20.04
95% Standard Bootstrap UCL	19.97	95% Bootstrap-t UCL	20.97
95% Hall's Bootstrap UCL	21.28	95% Percentile Bootstrap UCL	20.2
95% BCA Bootstrap UCL	20.7		
90% Chebyshev(Mean, Sd) UCL	22.43	95% Chebyshev(Mean, Sd) UCL	24.9
97.5% Chebyshev(Mean, Sd) UCL	28.33	99% Chebyshev(Mean, Sd) UCL	35.06

Suggested UCL to Use
95% Adjusted Gamma UCL 20.12

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.

Nickel

General Statistics

Total Number of Observations	41	Number of Distinct Observations	27

		Number of Missing Observations	0
Minimum	2	Mean	10.52
Maximum	24	Median	10
SD	4.826	Std. Error of Mean	0.754
Coefficient of Variation	0.459	Skewness	0.702

Normal GOF Test

Shapiro Wilk Test Statistic	0.959	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.119	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	11.79	95% Adjusted-CLT UCL (Chen-1995)	11.85
		95% Modified-t UCL (Johnson-1978)	11.8

Gamma GOF Test

A-D Test Statistic	0.417	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.132	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.138	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.388	k star (bias corrected MLE)	4.083
Theta hat (MLE)	2.398	Theta star (bias corrected MLE)	2.577
nu hat (MLE)	359.8	nu star (bias corrected)	334.8
MLE Mean (bias corrected)	10.52	MLE Sd (bias corrected)	5.207
		Approximate Chi Square Value (0.05)	293.4
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	292

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	12.01	95% Adjusted Gamma UCL (use when n<50)	12.06
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.938	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.162	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.693	Mean of logged Data	2.235
Maximum of Logged Data	3.178	SD of logged Data	0.529
Assuming Lognormal Distribution			
95% H-UCL	12.62	90% Chebyshev (MVUE) UCL	13.51
95% Chebyshev (MVUE) UCL	14.78	97.5% Chebyshev (MVUE) UCL	16.54
99% Chebyshev (MVUE) UCL	19.99		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	11.76	95% Jackknife UCL	11.79
95% Standard Bootstrap UCL	11.75	95% Bootstrap-t UCL	11.87
95% Hall's Bootstrap UCL	12.01	95% Percentile Bootstrap UCL	11.72
95% BCA Bootstrap UCL	11.87		
90% Chebyshev(Mean, Sd) UCL	12.78	95% Chebyshev(Mean, Sd) UCL	13.81
97.5% Chebyshev(Mean, Sd) UCL	15.23	99% Chebyshev(Mean, Sd) UCL	18.02
Suggested UCL to Use			

95% Student's-t UCL	11.79

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.

Selenium

General Statistics

Total Number of Observations	41	Number of Distinct Observations	22
Number of Detects	38	Number of Non-Detects	3
Number of Distinct Detects	22	Number of Distinct Non-Detects	3
Minimum Detect	0.41	Minimum Non-Detect	1.1
Maximum Detect	3.2	Maximum Non-Detect	1.7
Variance Detects	0.351	Percent Non-Detects	7.32%
Mean Detects	1.473	SD Detects	0.593
Median Detects	1.4	CV Detects	0.402
Skewness Detects	0.929	Kurtosis Detects	1.026
Mean of Logged Detects	0.309	SD of Logged Detects	0.409

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.94	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.938	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.126	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.144	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	1.44	Standard Error of Mean	0.0925
SD	0.58	95% KM (BCA) UCL	1.59
95% KM (t) UCL	1.596	95% KM (Percentile Bootstrap) UCL	1.599

95% KM (z) UCL	1.592	95% KM Bootstrap t UCL	1.619
90% KM Chebyshev UCL	1.718	95% KM Chebyshev UCL	1.843
97.5% KM Chebyshev UCL	2.018	99% KM Chebyshev UCL	2.361

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.286	Anderson-Darling GOF Test	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0781	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.143	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)	6.554	k star (bias corrected MLE)	6.054
Theta hat (MLE)	0.225	Theta star (bias corrected MLE)	0.243
nu hat (MLE)	498.1	nu star (bias corrected)	460.1
MLE Mean (bias corrected)	1.473	MLE Sd (bias corrected)	0.599

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	6.156	nu hat (KM)	504.8
Approximate Chi Square Value (504.83, α)	453.7	Adjusted Chi Square Value (504.83, β)	452
95% Gamma Approximate KM-UCL (use when n>=50)	1.602	95% Gamma Adjusted KM-UCL (use when n<50)	1.608

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	0.41	Mean	1.44
Maximum	3.2	Median	1.4
SD	0.584	CV	0.405
k hat (MLE)	6.617	k star (bias corrected MLE)	6.149
Theta hat (MLE)	0.218	Theta star (bias corrected MLE)	0.234

nu hat (MLE)	542.6	nu star (bias corrected)	504.2
MLE Mean (bias corrected)	1.44	MLE Sd (bias corrected)	0.581
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (504.22, α)	453.1	Adjusted Chi Square Value (504.22, β)	451.4
95% Gamma Approximate UCL (use when n>=50)	1.602	95% Gamma Adjusted UCL (use when n<50)	1.609

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.976	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.938	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0791	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	1.44	Mean in Log Scale	0.287
SD in Original Scale	0.584	SD in Log Scale	0.403
95% t UCL (assumes normality of ROS data)	1.593	95% Percentile Bootstrap UCL	1.604
95% BCA Bootstrap UCL	1.606	95% Bootstrap t UCL	1.613
95% H-UCL (Log ROS)	1.624		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	0.285	95% H-UCL (KM -Log)	1.625
KM SD (logged)	0.406	95% Critical H Value (KM-Log)	1.834
KM Standard Error of Mean (logged)	0.0656		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.418	Mean in Log Scale	0.261
SD in Original Scale	0.605	SD in Log Scale	0.433
95% t UCL (Assumes normality)	1.577	95% H-Stat UCL	1.618

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	1.596	95% KM (Percentile Bootstrap) UCL	1.599

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.

Silver

General Statistics

Total Number of Observations	41	Number of Distinct Observations	28
Number of Detects	37	Number of Non-Detects	4
Number of Distinct Detects	25	Number of Distinct Non-Detects	3
Minimum Detect	0.039	Minimum Non-Detect	0.033
Maximum Detect	0.28	Maximum Non-Detect	0.084
Variance Detects	0.00242	Percent Non-Detects	9.76%
Mean Detects	0.103	SD Detects	0.0492
Median Detects	0.087	CV Detects	0.476
Skewness Detects	1.461	Kurtosis Detects	3.189
Mean of Logged Detects	-2.368	SD of Logged Detects	0.444

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.885	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.936	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.176	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	0.0982	Standard Error of Mean	0.00778
SD	0.049	95% KM (BCA) UCL	0.111
95% KM (t) UCL	0.111	95% KM (Percentile Bootstrap) UCL	0.112
95% KM (z) UCL	0.111	95% KM Bootstrap t UCL	0.114
90% KM Chebyshev UCL	0.122	95% KM Chebyshev UCL	0.132
97.5% KM Chebyshev UCL	0.147	99% KM Chebyshev UCL	0.176

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.567	Anderson-Darling GOF Test	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.157	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.145	Detected Data Not 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)	5.266	k star (bias corrected MLE)	4.857
Theta hat (MLE)	0.0196	Theta star (bias corrected MLE)	0.0213
nu hat (MLE)	389.7	nu star (bias corrected)	359.4
MLE Mean (bias corrected)	0.103	MLE Sd (bias corrected)	0.0469

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	4.02	nu hat (KM)	329.6
Approximate Chi Square Value (329.63, α)	288.6	Adjusted Chi Square Value (329.63, β)	287.2
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	0.0139	Mean	0.0974

Maximum	0.28	Median	0.077
SD	0.0506	CV	0.519
k hat (MLE)	3.956	k star (bias corrected MLE)	3.683
Theta hat (MLE)	0.0246	Theta star (bias corrected MLE)	0.0265
nu hat (MLE)	324.4	nu star (bias corrected)	302
MLE Mean (bias corrected)	0.0974	MLE Sd (bias corrected)	0.0508
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (301.97, α)	262.7	Adjusted Chi Square Value (301.97, β)	261.4
95% Gamma Approximate UCL (use when n>=50)	0.112	95% Gamma Adjusted UCL (use when n<50)	0.113

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.975	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.936	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.136	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.146	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	0.0982	Mean in Log Scale	-2.433
SD in Original Scale	0.0496	SD in Log Scale	0.477
95% t UCL (assumes normality of ROS data)	0.111	95% Percentile Bootstrap UCL	0.111
95% BCA Bootstrap UCL	0.113	95% Bootstrap t UCL	0.114
95% H-UCL (Log ROS)	0.113		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.433	95% H-UCL (KM -Log)	0.113
KM SD (logged)	0.472	95% Critical H Value (KM-Log)	1.877
KM Standard Error of Mean (logged)	0.0756		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0964	Mean in Log Scale	-2.48

SD in Original Scale	0.0515	SD in Log Scale	0.557
95% t UCL (Assumes normality)	0.11	95% H-Stat UCL	0.116

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 (BCA) UCL	0.111	95% GROS Adjusted Gamma UCL	0.113
95% Adjusted Gamma KM-UCL	0.113		

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.

Vanadium

General Statistics

Total Number of Observations	41	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	10	Mean	30.49
Maximum	50	Median	31
SD	10.82	Std. Error of Mean	1.69
Coefficient of Variation	0.355	Skewness	0.118

Normal GOF Test

Shapiro Wilk Test Statistic	0.958	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.104	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	33.33	95% Adjusted-CLT UCL (Chen-1995)	33.3
		95% Modified-t UCL (Johnson-1978)	33.34

Gamma GOF Test

A-D Test Statistic	0.445	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.75	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	0.138	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.237	k star (bias corrected MLE)	6.724
Theta hat (MLE)	4.213	Theta star (bias corrected MLE)	4.534
nu hat (MLE)	593.4	nu star (bias corrected)	551.3
MLE Mean (bias corrected)	30.49	MLE Sd (bias corrected)	11.76
		Approximate Chi Square Value (0.05)	497.9
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	496

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	33.76	95% Adjusted Gamma UCL (use when n<50)	33.89

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.938	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.132	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.303	Mean of logged Data	3.347
Maximum of Logged Data	3.912	SD of logged Data	0.399

Assuming Lognormal Distribution

95% H-UCL	34.53	90% Chebyshev (MVUE) UCL	36.63
95% Chebyshev (MVUE) UCL	39.31	97.5% Chebyshev (MVUE) UCL	43.03
99% Chebyshev (MVUE) UCL	50.35		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	33.27	95% Jackknife UCL	33.33
95% Standard Bootstrap UCL	33.18	95% Bootstrap-t UCL	33.35
95% Hall's Bootstrap UCL	33.3	95% Percentile Bootstrap UCL	33.15
95% BCA Bootstrap UCL	33.22		
90% Chebyshev(Mean, Sd) UCL	35.56	95% Chebyshev(Mean, Sd) UCL	37.86
97.5% Chebyshev(Mean, Sd) UCL	41.04	99% Chebyshev(Mean, Sd) UCL	47.31

Suggested UCL to Use

95% Student's-t UCL	33.33

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.

Zinc

General Statistics

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin

Pro-UCL Output Data

Total Number of Observations	41	Number of Distinct Observations	35
		Number of Missing Observations	0
Minimum	17	Mean	78.24
Maximum	220	Median	59
SD	48	Std. Error of Mean	7.496
Coefficient of Variation	0.613	Skewness	1.353
Normal GOF Test			
Shapiro Wilk Test Statistic	0.852	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.202	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	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	90.87	95% Adjusted-CLT UCL (Chen-1995)	92.27
		95% Modified-t UCL (Johnson-1978)	91.13
Gamma GOF Test			
A-D Test Statistic	0.931	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.143	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.139	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.221	k star (bias corrected MLE)	3.001
Theta hat (MLE)	24.29	Theta star (bias corrected MLE)	26.07
nu hat (MLE)	264.1	nu star (bias corrected)	246.1
MLE Mean (bias corrected)	78.24	MLE Sd (bias corrected)	45.16
		Approximate Chi Square Value (0.05)	210.8

Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	209.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	91.35	95% Adjusted Gamma UCL (use when n<50)	91.87
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.107	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.833	Mean of logged Data	4.197
Maximum of Logged Data	5.394	SD of logged Data	0.576
Assuming Lognormal Distribution			
95% H-UCL	93.75	90% Chebyshev (MVUE) UCL	100.5
95% Chebyshev (MVUE) UCL	110.7	97.5% Chebyshev (MVUE) UCL	124.8
99% Chebyshev (MVUE) UCL	152.5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	90.57	95% Jackknife UCL	90.87
95% Standard Bootstrap UCL	90	95% Bootstrap-t UCL	93.35
95% Hall's Bootstrap UCL	92.47	95% Percentile Bootstrap UCL	90.73
95% BCA Bootstrap UCL	91.37		
90% Chebyshev(Mean, Sd) UCL	100.7	95% Chebyshev(Mean, Sd) UCL	110.9
97.5% Chebyshev(Mean, Sd) UCL	125.1	99% Chebyshev(Mean, Sd) UCL	152.8

Suggested UCL to Use
95% H-UCL 93.75

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.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Mercury

General Statistics

Total Number of Observations	41	Number of Distinct Observations	32
Number of Detects	40	Number of Non-Detects	1
Number of Distinct Detects	31	Number of Distinct Non-Detects	1
Minimum Detect	0.019	Minimum Non-Detect	0.021
Maximum Detect	0.24	Maximum Non-Detect	0.021
Variance Detects	0.00303	Percent Non-Detects	2.44%
Mean Detects	0.0855	SD Detects	0.0551
Median Detects	0.077	CV Detects	0.644
Skewness Detects	1.297	Kurtosis Detects	1.094
Mean of Logged Detects	-2.645	SD of Logged Detects	0.62

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.861	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.94	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.2	Lilliefors GOF Test
5% Lilliefors Critical Value	0.14	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	0.0839	Standard Error of Mean	0.00865
SD	0.0547	95% KM (BCA) UCL	0.099
95% KM (t) UCL	0.0984	95% KM (Percentile Bootstrap) UCL	0.0982
95% KM (z) UCL	0.0981	95% KM Bootstrap t UCL	0.102
90% KM Chebyshev UCL	0.11	95% KM Chebyshev UCL	0.122
97.5% KM Chebyshev UCL	0.138	99% KM Chebyshev UCL	0.17

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.543	Anderson-Darling GOF Test
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.124	Kolmogrov-Smirnoff GOF
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 on Detected Data Only

k hat (MLE)	2.851	k star (bias corrected MLE)	2.654
Theta hat (MLE)	0.03	Theta star (bias corrected MLE)	0.0322
nu hat (MLE)	228.1	nu star (bias corrected)	212.3
MLE Mean (bias corrected)	0.0855	MLE Sd (bias corrected)	0.0525

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	2.355	nu hat (KM)	193.1
Approximate Chi Square Value (193.07, α)	161.9	Adjusted Chi Square Value (193.07, β)	160.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.1	95% Gamma Adjusted KM-UCL (use when n<50)	0.101

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	0.0837
Maximum	0.24	Median	0.077
SD	0.0556	CV	0.665
k hat (MLE)	2.517	k star (bias corrected MLE)	2.349
Theta hat (MLE)	0.0332	Theta star (bias corrected MLE)	0.0356
nu hat (MLE)	206.4	nu star (bias corrected)	192.7
MLE Mean (bias corrected)	0.0837	MLE Sd (bias corrected)	0.0546
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (192.65, α)	161.5	Adjusted Chi Square Value (192.65, β)	160.5
95% Gamma Approximate UCL (use when n>=50)	0.0998	95% Gamma Adjusted UCL (use when n<50)	0.1

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.974	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.94	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0833	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.14	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	0.0839	Mean in Log Scale	-2.678
SD in Original Scale	0.0554	SD in Log Scale	0.648
95% t UCL (assumes normality of ROS data)	0.0984	95% Percentile Bootstrap UCL	0.0982
95% BCA Bootstrap UCL	0.0995	95% Bootstrap t UCL	0.1
95% H-UCL (Log ROS)	0.104		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.677	95% H-UCL (KM -Log)	0.103
KM SD (logged)	0.638	95% Critical H Value (KM-Log)	2.002
KM Standard Error of Mean (logged)	0.101		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0837	Mean in Log Scale	-2.691
SD in Original Scale	0.0556	SD in Log Scale	0.681
95% t UCL (Assumes normality)	0.0983	95% H-Stat UCL	0.106

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	0.099	95% GROS Adjusted Gamma UCL	0.1
95% Adjusted Gamma KM-UCL	0.101		

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.

PCB-1260

General Statistics

Total Number of Observations	41	Number of Distinct Observations	32
Number of Detects	21	Number of Non-Detects	20
Number of Distinct Detects	20	Number of Distinct Non-Detects	14
Minimum Detect	0.0086	Minimum Non-Detect	0.0074
Maximum Detect	0.61	Maximum Non-Detect	0.039
Variance Detects	0.0203	Percent Non-Detects	48.78%
Mean Detects	0.139	SD Detects	0.143
Median Detects	0.095	CV Detects	1.029
Skewness Detects	2.009	Kurtosis Detects	5.063
Mean of Logged Detects	-2.474	SD of Logged Detects	1.093

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.793	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.228	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.193	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	0.0753	Standard Error of Mean	0.019
SD	0.119	95% KM (BCA) UCL	0.11
95% KM (t) UCL	0.107	95% KM (Percentile Bootstrap) UCL	0.107
95% KM (z) UCL	0.107	95% KM Bootstrap t UCL	0.124
90% KM Chebyshev UCL	0.132	95% KM Chebyshev UCL	0.158
97.5% KM Chebyshev UCL	0.194	99% KM Chebyshev UCL	0.265
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.229	Anderson-Darling GOF Test	
5% A-D Critical Value	0.766	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.126	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.194	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)	1.143	k star (bias corrected MLE)	1.011
Theta hat (MLE)	0.121	Theta star (bias corrected MLE)	0.137
nu hat (MLE)	47.99	nu star (bias corrected)	42.47
MLE Mean (bias corrected)	0.139	MLE Sd (bias corrected)	0.138
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.402	nu hat (KM)	32.94
Approximate Chi Square Value (32.94, α)	20.82	Adjusted Chi Square Value (32.94, β)	20.47
95% Gamma Approximate KM-UCL (use when n>=50)	0.119	95% Gamma Adjusted KM-UCL (use when n<50)	0.121

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	0.0086	Mean	0.0759
Maximum	0.61	Median	0.01
SD	0.12	CV	1.582
k hat (MLE)	0.653	k star (bias corrected MLE)	0.621
Theta hat (MLE)	0.116	Theta star (bias corrected MLE)	0.122
nu hat (MLE)	53.54	nu star (bias corrected)	50.96
MLE Mean (bias corrected)	0.0759	MLE Sd (bias corrected)	0.0962
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (50.96, α)	35.56	Adjusted Chi Square Value (50.96, β)	35.09
95% Gamma Approximate UCL (use when n>=50)	0.109	95% Gamma Adjusted UCL (use when n<50)	0.11

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.979	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.1	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.193	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	0.0744	Mean in Log Scale	-3.74
SD in Original Scale	0.121	SD in Log Scale	1.56
95% t UCL (assumes normality of ROS data)	0.106	95% Percentile Bootstrap UCL	0.107
95% BCA Bootstrap UCL	0.115	95% Bootstrap t UCL	0.125
95% H-UCL (Log ROS)	0.169		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.599	95% H-UCL (KM -Log)	0.136
KM SD (logged)	1.398	95% Critical H Value (KM-Log)	2.825
KM Standard Error of Mean (logged)	0.227		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0756	Mean in Log Scale	-3.608
SD in Original Scale	0.12	SD in Log Scale	1.453
95% t UCL (Assumes normality)	0.107	95% H-Stat UCL	0.151

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	0.107	95% GROS Adjusted Gamma UCL	0.11
95% Adjusted Gamma KM-UCL	0.121		

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.

Benzene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	32
Number of Detects	3	Number of Non-Detects	38
Number of Distinct Detects	3	Number of Distinct Non-Detects	31
Minimum Detect	0.0066	Minimum Non-Detect	0.0059
Maximum Detect	0.032	Maximum Non-Detect	0.58
Variance Detects	1.84E-04	Percent Non-Detects	92.68%

Mean Detects	0.0165	SD Detects	0.0136
Median Detects	0.011	CV Detects	0.821
Skewness Detects	1.53	Kurtosis Detects	N/A
Mean of Logged Detects	-4.324	SD of Logged Detects	0.806

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.875	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.325	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.512	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	0.00807	Standard Error of Mean	0.00157
SD	0.00548	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0107	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0106	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0128	95% KM Chebyshev UCL	0.0149
97.5% KM Chebyshev UCL	0.0179	99% KM Chebyshev UCL	0.0237

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.408	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00687	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	14.45	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)	2.169	nu hat (KM)	177.9
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (177.87, α)	148	Adjusted Chi Square Value (177.87, β)	147
95% Gamma Approximate KM-UCL (use when n>=50)	0.00969	95% Gamma Adjusted KM-UCL (use when n<50)	0.00976
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.96	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.258	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.512	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	0.00534	Mean in Log Scale	-5.367
SD in Original Scale	0.00455	SD in Log Scale	0.434
95% t UCL (assumes normality of ROS data)	0.00653	95% Percentile Bootstrap UCL	0.0066
95% BCA Bootstrap UCL	0.00753	95% Bootstrap t UCL	0.00878
95% H-UCL (Log ROS)	0.00582		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.925	95% H-UCL (KM -Log)	0.00871
KM SD (logged)	0.381	95% Critical H Value (KM-Log)	1.818
KM Standard Error of Mean (logged)	0.128		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0348	Mean in Log Scale	-3.981
SD in Original Scale	0.0609	SD in Log Scale	1.002
95% t UCL (Assumes normality)	0.0508	95% H-Stat UCL	0.0448
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	0.0107	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.

Ethylbenzene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	33
Number of Detects	19	Number of Non-Detects	22
Number of Distinct Detects	18	Number of Distinct Non-Detects	18
Minimum Detect	0.015	Minimum Non-Detect	0.021
Maximum Detect	4.7	Maximum Non-Detect	1.5
Variance Detects	1.162	Percent Non-Detects	53.66%
Mean Detects	0.573	SD Detects	1.078
Median Detects	0.23	CV Detects	1.881
Skewness Detects	3.488	Kurtosis Detects	13.19
Mean of Logged Detects	-1.531	SD of Logged Detects	1.449

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.505	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.901	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.361	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.203	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	0.281	Standard Error of Mean	0.123
SD	0.765	95% KM (BCA) UCL	0.517
95% KM (t) UCL	0.488	95% KM (Percentile Bootstrap) UCL	0.501
95% KM (z) UCL	0.483	95% KM Bootstrap t UCL	0.851
90% KM Chebyshev UCL	0.65	95% KM Chebyshev UCL	0.817
97.5% KM Chebyshev UCL	1.049	99% KM Chebyshev UCL	1.505

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.107	Anderson-Darling GOF Test	
5% A-D Critical Value	0.79	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.264	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.208	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)	0.63	k star (bias corrected MLE)	0.565
Theta hat (MLE)	0.91	Theta star (bias corrected MLE)	1.014
nu hat (MLE)	23.93	nu star (bias corrected)	21.48
MLE Mean (bias corrected)	0.573	MLE Sd (bias corrected)	0.762

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.135	nu hat (KM)	11.04
Approximate Chi Square Value (11.04, α)	4.604	Adjusted Chi Square Value (11.04, β)	4.452
95% Gamma Approximate KM-UCL (use when n>=50)	0.674	95% Gamma Adjusted KM-UCL (use when n<50)	0.697

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	0.271
Maximum	4.7	Median	0.01
SD	0.777	CV	2.868
k hat (MLE)	0.357	k star (bias corrected MLE)	0.348
Theta hat (MLE)	0.758	Theta star (bias corrected MLE)	0.78
nu hat (MLE)	29.31	nu star (bias corrected)	28.5
MLE Mean (bias corrected)	0.271	MLE Sd (bias corrected)	0.46
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (28.50, α)	17.32	Adjusted Chi Square Value (28.50, β)	17
95% Gamma Approximate UCL (use when n>=50)	0.446	95% Gamma Adjusted UCL (use when n<50)	0.454

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.937	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.19	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.203	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	0.279	Mean in Log Scale	-2.722
SD in Original Scale	0.774	SD in Log Scale	1.515
95% t UCL (assumes normality of ROS data)	0.483	95% Percentile Bootstrap UCL	0.494
95% BCA Bootstrap UCL	0.623	95% Bootstrap t UCL	0.855
95% H-UCL (Log ROS)	0.423		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.777	95% H-UCL (KM -Log)	0.439
KM SD (logged)	1.555	95% Critical H Value (KM-Log)	3.028
KM Standard Error of Mean (logged)	0.265		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.308	Mean in Log Scale	-2.375
SD in Original Scale	0.773	SD in Log Scale	1.404
95% t UCL (Assumes normality)	0.511	95% H-Stat UCL	0.467

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 0.517

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.

m,p-xylene

General Statistics

Total Number of Observations	40	Number of Distinct Observations	36
		Number of Missing Observations	1
Number of Detects	21	Number of Non-Detects	19
Number of Distinct Detects	20	Number of Distinct Non-Detects	17
Minimum Detect	0.016	Minimum Non-Detect	0.014
Maximum Detect	17	Maximum Non-Detect	2.9
Variance Detects	14.84	Percent Non-Detects	47.50%
Mean Detects	1.744	SD Detects	3.853
Median Detects	0.38	CV Detects	2.209
Skewness Detects	3.496	Kurtosis Detects	13.26
Mean of Logged Detects	-0.987	SD of Logged Detects	1.86

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.484	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.376	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.193	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	0.935	Standard Error of Mean	0.463
SD	2.855	95% KM (BCA) UCL	1.849
95% KM (t) UCL	1.715	95% KM (Percentile Bootstrap) UCL	1.797
95% KM (z) UCL	1.696	95% KM Bootstrap t UCL	3.139
90% KM Chebyshev UCL	2.324	95% KM Chebyshev UCL	2.952
97.5% KM Chebyshev UCL	3.825	99% KM Chebyshev UCL	5.54
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.977	Anderson-Darling GOF Test	
5% A-D Critical Value	0.821	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.212	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.202	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)	0.423	k star (bias corrected MLE)	0.394
Theta hat (MLE)	4.125	Theta star (bias corrected MLE)	4.425
nu hat (MLE)	17.76	nu star (bias corrected)	16.55
MLE Mean (bias corrected)	1.744	MLE Sd (bias corrected)	2.778
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.107	nu hat (KM)	8.586
Approximate Chi Square Value (8.59, α)	3.079	Adjusted Chi Square Value (8.59, β)	2.956
95% Gamma Approximate KM-UCL (use when n>=50)	2.608	95% Gamma Adjusted KM-UCL (use when n<50)	2.717

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	0.92
Maximum	17	Median	0.0205
SD	2.895	CV	3.146
k hat (MLE)	0.268	k star (bias corrected MLE)	0.264
Theta hat (MLE)	3.436	Theta star (bias corrected MLE)	3.481
nu hat (MLE)	21.43	nu star (bias corrected)	21.15
MLE Mean (bias corrected)	0.92	MLE Sd (bias corrected)	1.79
		Adjusted Level of Significance (β)	0.044
Approximate Chi Square Value (21.15, α)	11.71	Adjusted Chi Square Value (21.15, β)	11.44
95% Gamma Approximate UCL (use when n>=50)	1.663	95% Gamma Adjusted UCL (use when n<50)	1.702

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.975	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.09	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.193	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	0.924	Mean in Log Scale	-2.56
SD in Original Scale	2.894	SD in Log Scale	2.213
95% t UCL (assumes normality of ROS data)	1.695	95% Percentile Bootstrap UCL	1.742
95% BCA Bootstrap UCL	2.175	95% Bootstrap t UCL	2.848
95% H-UCL (Log ROS)	3.823		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.308	95% H-UCL (KM -Log)	2.346
KM SD (logged)	1.984	95% Critical H Value (KM-Log)	3.751
KM Standard Error of Mean (logged)	0.335		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.982	Mean in Log Scale	-1.9
SD in Original Scale	2.884	SD in Log Scale	1.849
95% t UCL (Assumes normality)	1.75	95% H-Stat UCL	2.363

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	3.825

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.

o-xylene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	38
Number of Detects	18	Number of Non-Detects	23
Number of Distinct Detects	18	Number of Distinct Non-Detects	21
Minimum Detect	0.0099	Minimum Non-Detect	0.0088
Maximum Detect	11	Maximum Non-Detect	1.5
Variance Detects	7.019	Percent Non-Detects	56.10%
Mean Detects	1.337	SD Detects	2.649

Median Detects	0.41	CV Detects	1.982
Skewness Detects	3.239	Kurtosis Detects	11.38
Mean of Logged Detects	-1.055	SD of Logged Detects	1.774

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.536	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.33	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.209	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	0.598	Standard Error of Mean	0.294
SD	1.827	95% KM (BCA) UCL	1.183
95% KM (t) UCL	1.093	95% KM (Percentile Bootstrap) UCL	1.114
95% KM (z) UCL	1.082	95% KM Bootstrap t UCL	2.252
90% KM Chebyshev UCL	1.48	95% KM Chebyshev UCL	1.879
97.5% KM Chebyshev UCL	2.433	99% KM Chebyshev UCL	3.521

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.669	Anderson-Darling GOF Test	
5% A-D Critical Value	0.805	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.212	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)	0.476	k star (bias corrected MLE)	0.434
Theta hat (MLE)	2.809	Theta star (bias corrected MLE)	3.083
nu hat (MLE)	17.13	nu star (bias corrected)	15.61
MLE Mean (bias corrected)	1.337	MLE Sd (bias corrected)	2.03

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.107	nu hat (KM)	8.796
Approximate Chi Square Value (8.80, α)	3.204	Adjusted Chi Square Value (8.80, β)	3.081
95% Gamma Approximate KM-UCL (use when n>=50)	1.643	95% Gamma Adjusted KM-UCL (use when n<50)	1.708
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	0.0099	Mean	0.593
Maximum	11	Median	0.01
SD	1.851	CV	3.124
k hat (MLE)	0.277	k star (bias corrected MLE)	0.273
Theta hat (MLE)	2.14	Theta star (bias corrected MLE)	2.171
nu hat (MLE)	22.71	nu star (bias corrected)	22.38
MLE Mean (bias corrected)	0.593	MLE Sd (bias corrected)	1.134
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (22.38, α)	12.62	Adjusted Chi Square Value (22.38, β)	12.35
95% Gamma Approximate UCL (use when n>=50)	1.051	95% Gamma Adjusted UCL (use when n<50)	1.073
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.987	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0983	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	0.591	Mean in Log Scale	-3.287
SD in Original Scale	1.852	SD in Log Scale	2.36
95% t UCL (assumes normality of ROS data)	1.078	95% Percentile Bootstrap UCL	1.109

95% BCA Bootstrap UCL	1.488	95% Bootstrap t UCL	2.072
95% H-UCL (Log ROS)	2.862		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.942	95% H-UCL (KM -Log)	1.642
KM SD (logged)	2.093	95% Critical H Value (KM-Log)	3.772
KM Standard Error of Mean (logged)	0.35		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.623	Mean in Log Scale	-2.479
SD in Original Scale	1.845	SD in Log Scale	1.906
95% t UCL (Assumes normality)	1.108	95% H-Stat UCL	1.482

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	1.093	95% GROS Adjusted Gamma UCL	1.073
95% Adjusted Gamma KM-UCL	1.708		

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.

Total Xylenes

General Statistics

Total Number of Observations	41	Number of Distinct Observations	38
Number of Detects	24	Number of Non-Detects	17

Number of Distinct Detects	24	Number of Distinct Non-Detects	15
Minimum Detect	0.029	Minimum Non-Detect	0.037
Maximum Detect	28	Maximum Non-Detect	4.4
Variance Detects	35.6	Percent Non-Detects	41.46%
Mean Detects	2.606	SD Detects	5.967
Median Detects	0.465	CV Detects	2.29
Skewness Detects	3.743	Kurtosis Detects	15.3
Mean of Logged Detects	-0.59	SD of Logged Detects	1.822

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.468	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.352	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	1.56	Standard Error of Mean	0.741
SD	4.641	95% KM (BCA) UCL	2.775
95% KM (t) UCL	2.807	95% KM (Percentile Bootstrap) UCL	2.913
95% KM (z) UCL	2.778	95% KM Bootstrap t UCL	5.413
90% KM Chebyshev UCL	3.782	95% KM Chebyshev UCL	4.788
97.5% KM Chebyshev UCL	6.185	99% KM Chebyshev UCL	8.929

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.114	Anderson-Darling GOF Test	
5% A-D Critical Value	0.824	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.186	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.19	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)	0.422	k star (bias corrected MLE)	0.397
Theta hat (MLE)	6.18	Theta star (bias corrected MLE)	6.568
nu hat (MLE)	20.24	nu star (bias corrected)	19.04
MLE Mean (bias corrected)	2.606	MLE Sd (bias corrected)	4.137

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.113	nu hat (KM)	9.264
Approximate Chi Square Value (9.26, α)	3.487	Adjusted Chi Square Value (9.26, β)	3.358
95% Gamma Approximate KM-UCL (use when n>=50)	4.144	95% Gamma Adjusted KM-UCL (use when n<50)	4.303

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	1.53
Maximum	28	Median	0.081
SD	4.706	CV	3.077
k hat (MLE)	0.263	k star (bias corrected MLE)	0.26
Theta hat (MLE)	5.817	Theta star (bias corrected MLE)	5.884
nu hat (MLE)	21.56	nu star (bias corrected)	21.32
MLE Mean (bias corrected)	1.53	MLE Sd (bias corrected)	3
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (21.32, α)	11.83	Adjusted Chi Square Value (21.32, β)	11.57
95% Gamma Approximate UCL (use when n>=50)	2.757	95% Gamma Adjusted UCL (use when n<50)	2.818

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.977	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.916	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0733	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.181	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	1.546	Mean in Log Scale	-1.655
SD in Original Scale	4.701	SD in Log Scale	1.923
95% t UCL (assumes normality of ROS data)	2.782	95% Percentile Bootstrap UCL	2.857
95% BCA Bootstrap UCL	3.94	95% Bootstrap t UCL	5.602
95% H-UCL (Log ROS)	3.554		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-1.602	95% H-UCL (KM -Log)	3.347
KM SD (logged)	1.884	95% Critical H Value (KM-Log)	3.477
KM Standard Error of Mean (logged)	0.312		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.62	Mean in Log Scale	-1.326
SD in Original Scale	4.688	SD in Log Scale	1.799
95% t UCL (Assumes normality)	2.853	95% H-Stat UCL	3.484

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 (BCA) UCL	2.775	95% GROS Adjusted Gamma UCL	2.818
95% Adjusted Gamma KM-UCL	4.303		

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.

1-Methylnaphthalene

General Statistics			
Total Number of Observations	41	Number of Distinct Observations	39
Number of Detects	40	Number of Non-Detects	1
Number of Distinct Detects	38	Number of Distinct Non-Detects	1
Minimum Detect	0.021	Minimum Non-Detect	0.004
Maximum Detect	78	Maximum Non-Detect	0.004
Variance Detects	430.1	Percent Non-Detects	2.44%
Mean Detects	14.49	SD Detects	20.74
Median Detects	4.55	CV Detects	1.431
Skewness Detects	1.704	Kurtosis Detects	2.015
Mean of Logged Detects	1.008	SD of Logged Detects	2.414

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.724	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.94	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.243	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.14	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	14.13	Standard Error of Mean	3.218
SD	20.35	95% KM (BCA) UCL	19.24
95% KM (t) UCL	19.55	95% KM (Percentile Bootstrap) UCL	19.51
95% KM (z) UCL	19.43	95% KM Bootstrap t UCL	20.69
90% KM Chebyshev UCL	23.79	95% KM Chebyshev UCL	28.16
97.5% KM Chebyshev UCL	34.23	99% KM Chebyshev UCL	46.16

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.469	Anderson-Darling GOF Test	
5% A-D Critical Value	0.836	Detected data appear Gamma Distributed at 5% Significance Level	

K-S Test Statistic	0.101	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.15	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)	0.396	k star (bias corrected MLE)	0.383
Theta hat (MLE)	36.6	Theta star (bias corrected MLE)	37.84
nu hat (MLE)	31.67	nu star (bias corrected)	30.63
MLE Mean (bias corrected)	14.49	MLE Sd (bias corrected)	23.42

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.482	nu hat (KM)	39.56
Approximate Chi Square Value (39.56, α)	26.15	Adjusted Chi Square Value (39.56, β)	25.75
95% Gamma Approximate KM-UCL (use when n>=50)	21.38	95% Gamma Adjusted KM-UCL (use when n<50)	21.71

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	14.13
Maximum	78	Median	3.9
SD	20.6	CV	1.458
k hat (MLE)	0.374	k star (bias corrected MLE)	0.363
Theta hat (MLE)	37.77	Theta star (bias corrected MLE)	38.93
nu hat (MLE)	30.69	nu star (bias corrected)	29.77
MLE Mean (bias corrected)	14.13	MLE Sd (bias corrected)	23.46
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (29.77, α)	18.32	Adjusted Chi Square Value (29.77, β)	17.99
95% Gamma Approximate UCL (use when n>=50)	22.98	95% Gamma Adjusted UCL (use when n<50)	23.4

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.919	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.94	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.14	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	14.13	Mean in Log Scale	0.86
SD in Original Scale	20.6	SD in Log Scale	2.564
95% t UCL (assumes normality of ROS data)	19.55	95% Percentile Bootstrap UCL	19.55
95% BCA Bootstrap UCL	20.11	95% Bootstrap t UCL	20.71
95% H-UCL (Log ROS)	386.8		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	0.849	95% H-UCL (KM -Log)	376.5
KM SD (logged)	2.56	95% Critical H Value (KM-Log)	4.456
KM Standard Error of Mean (logged)	0.405		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	14.13	Mean in Log Scale	0.832
SD in Original Scale	20.6	SD in Log Scale	2.637
95% t UCL (Assumes normality)	19.55	95% H-Stat UCL	499.3

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	28.16	95% GROS Adjusted Gamma UCL	23.4
95% Adjusted Gamma KM-UCL	21.71		

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.

2-Methylnaphthalene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	34
Number of Detects	39	Number of Non-Detects	2
Number of Distinct Detects	32	Number of Distinct Non-Detects	2
Minimum Detect	0.04	Minimum Non-Detect	0.004
Maximum Detect	86	Maximum Non-Detect	0.027
Variance Detects	617.4	Percent Non-Detects	4.88%
Mean Detects	17.7	SD Detects	24.85
Median Detects	4.1	CV Detects	1.404
Skewness Detects	1.652	Kurtosis Detects	1.837
Mean of Logged Detects	1.249	SD of Logged Detects	2.371

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.724	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.258	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.142	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	16.84	Standard Error of Mean	3.832
SD	24.22	95% KM (BCA) UCL	23.26
95% KM (t) UCL	23.29	95% KM (Percentile Bootstrap) UCL	23.48
95% KM (z) UCL	23.14	95% KM Bootstrap t UCL	24.95
90% KM Chebyshev UCL	28.33	95% KM Chebyshev UCL	33.54

97.5% KM Chebyshev UCL	40.77	99% KM Chebyshev UCL	54.97

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.553	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	0.151	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)	0.404	k star (bias corrected MLE)	0.39
Theta hat (MLE)	43.77	Theta star (bias corrected MLE)	45.34
nu hat (MLE)	31.54	nu star (bias corrected)	30.45
MLE Mean (bias corrected)	17.7	MLE Sd (bias corrected)	28.33

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.483	nu hat (KM)	39.62
Approximate Chi Square Value (39.62, α)	26.2	Adjusted Chi Square Value (39.62, β)	25.8
95% Gamma Approximate KM-UCL (use when n>=50)	25.46	95% Gamma Adjusted KM-UCL (use when n<50)	25.86

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	16.84
Maximum	86	Median	3.9
SD	24.52	CV	1.456
k hat (MLE)	0.36	k star (bias corrected MLE)	0.35
Theta hat (MLE)	46.79	Theta star (bias corrected MLE)	48.13
nu hat (MLE)	29.51	nu star (bias corrected)	28.69
MLE Mean (bias corrected)	16.84	MLE Sd (bias corrected)	28.47

		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (28.69, α)	17.46	Adjusted Chi Square Value (28.69, β)	17.14
95% Gamma Approximate UCL (use when n>=50)	27.66	95% Gamma Adjusted UCL (use when n<50)	28.18

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.914	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.133	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.142	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	16.84	Mean in Log Scale	0.979
SD in Original Scale	24.52	SD in Log Scale	2.607
95% t UCL (assumes normality of ROS data)	23.29	95% Percentile Bootstrap UCL	23.18
95% BCA Bootstrap UCL	24.21	95% Bootstrap t UCL	25.14
95% H-UCL (Log ROS)	514.4		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	0.919	95% H-UCL (KM -Log)	727.4
KM SD (logged)	2.708	95% Critical H Value (KM-Log)	4.677
KM Standard Error of Mean (logged)	0.429		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	16.84	Mean in Log Scale	0.932
SD in Original Scale	24.52	SD in Log Scale	2.72
95% t UCL (Assumes normality)	23.29	95% H-Stat UCL	773

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	33.54	95% GROS Adjusted Gamma UCL	28.18
95% Adjusted Gamma KM-UCL	25.86		

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.

Acenaphthene

General Statistics			
Total Number of Observations	41	Number of Distinct Observations	38
Number of Detects	36	Number of Non-Detects	5
Number of Distinct Detects	34	Number of Distinct Non-Detects	5
Minimum Detect	0.011	Minimum Non-Detect	0.004
Maximum Detect	5.2	Maximum Non-Detect	0.043
Variance Detects	1.404	Percent Non-Detects	12.20%
Mean Detects	0.864	SD Detects	1.185
Median Detects	0.545	CV Detects	1.372
Skewness Detects	2.317	Kurtosis Detects	5.425
Mean of Logged Detects	-1.192	SD of Logged Detects	1.77

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.698	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.935	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.268	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	0.759	Standard Error of Mean	0.179
SD	1.13	95% KM (BCA) UCL	1.081
95% KM (t) UCL	1.061	95% KM (Percentile Bootstrap) UCL	1.065
95% KM (z) UCL	1.054	95% KM Bootstrap t UCL	1.19
90% KM Chebyshev UCL	1.296	95% KM Chebyshev UCL	1.54
97.5% KM Chebyshev UCL	1.877	99% KM Chebyshev UCL	2.54

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.548	Anderson-Darling GOF Test	
5% A-D Critical Value	0.803	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.098	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)	0.592	k star (bias corrected MLE)	0.561
Theta hat (MLE)	1.459	Theta star (bias corrected MLE)	1.539
nu hat (MLE)	42.63	nu star (bias corrected)	40.41
MLE Mean (bias corrected)	0.864	MLE Sd (bias corrected)	1.153

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.452	nu hat (KM)	37.03
Approximate Chi Square Value (37.03, α)	24.1	Adjusted Chi Square Value (37.03, β)	23.72
95% Gamma Approximate KM-UCL (use when n>=50)	1.167	95% Gamma Adjusted KM-UCL (use when n<50)	1.186

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	0.76
Maximum	5.2	Median	0.37

SD	1.144	CV	1.506
k hat (MLE)	0.479	k star (bias corrected MLE)	0.461
Theta hat (MLE)	1.584	Theta star (bias corrected MLE)	1.649
nu hat (MLE)	39.32	nu star (bias corrected)	37.77
MLE Mean (bias corrected)	0.76	MLE Sd (bias corrected)	1.119
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (37.77, α)	24.7	Adjusted Chi Square Value (37.77, β)	24.31
95% Gamma Approximate UCL (use when n>=50)	1.162	95% Gamma Adjusted UCL (use when n<50)	1.18

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.912	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.935	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.171	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.148	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	0.76	Mean in Log Scale	-1.607
SD in Original Scale	1.144	SD in Log Scale	2.018
95% t UCL (assumes normality of ROS data)	1.061	95% Percentile Bootstrap UCL	1.065
95% BCA Bootstrap UCL	1.134	95% Bootstrap t UCL	1.225
95% H-UCL (Log ROS)	4.941		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.759	Mean in Log Scale	-1.657
SD in Original Scale	1.144	SD in Log Scale	2.105
95% t UCL (Assumes normality)	1.06	95% H-Stat UCL	6.165

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	1.54	95% GROS Adjusted Gamma UCL	1.18
95% Adjusted Gamma KM-UCL	1.186		

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.

Acenaphthylene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	40
Number of Detects	36	Number of Non-Detects	5
Number of Distinct Detects	35	Number of Distinct Non-Detects	5
Minimum Detect	0.0033	Minimum Non-Detect	0.004
Maximum Detect	2.9	Maximum Non-Detect	0.043
Variance Detects	0.567	Percent Non-Detects	12.20%
Mean Detects	0.565	SD Detects	0.753
Median Detects	0.255	CV Detects	1.333
Skewness Detects	1.85	Kurtosis Detects	2.632
Mean of Logged Detects	-1.6	SD of Logged Detects	1.73

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.724	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.935	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.248	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	0.497	Standard Error of Mean	0.114
SD	0.72	95% KM (BCA) UCL	0.69
95% KM (t) UCL	0.689	95% KM (Percentile Bootstrap) UCL	0.684
95% KM (z) UCL	0.684	95% KM Bootstrap t UCL	0.748
90% KM Chebyshev UCL	0.839	95% KM Chebyshev UCL	0.994
97.5% KM Chebyshev UCL	1.209	99% KM Chebyshev UCL	1.631

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.308	Anderson-Darling GOF Test	
5% A-D Critical Value	0.803	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0847	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)	0.6	k star (bias corrected MLE)	0.569
Theta hat (MLE)	0.941	Theta star (bias corrected MLE)	0.994
nu hat (MLE)	43.22	nu star (bias corrected)	40.95
MLE Mean (bias corrected)	0.565	MLE Sd (bias corrected)	0.749

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.477	nu hat (KM)	39.08
Approximate Chi Square Value (39.08, α)	25.76	Adjusted Chi Square Value (39.08, β)	25.37
95% Gamma Approximate KM-UCL (use when n>=50)	0.754	95% Gamma Adjusted KM-UCL (use when n<50)	0.765

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	0.0033	Mean	0.497
Maximum	2.9	Median	0.22

SD	0.728	CV	1.464
k hat (MLE)	0.501	k star (bias corrected MLE)	0.48
Theta hat (MLE)	0.993	Theta star (bias corrected MLE)	1.035
nu hat (MLE)	41.06	nu star (bias corrected)	39.39
MLE Mean (bias corrected)	0.497	MLE Sd (bias corrected)	0.718
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (39.39, α)	26.01	Adjusted Chi Square Value (39.39, β)	25.61
95% Gamma Approximate UCL (use when n>=50)	0.753	95% Gamma Adjusted UCL (use when n<50)	0.765

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.953	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.935	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.127	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	0.497	Mean in Log Scale	-1.998
SD in Original Scale	0.728	SD in Log Scale	1.952
95% t UCL (assumes normality of ROS data)	0.689	95% Percentile Bootstrap UCL	0.679
95% BCA Bootstrap UCL	0.729	95% Bootstrap t UCL	0.755
95% H-UCL (Log ROS)	2.743		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.068	95% H-UCL (KM -Log)	3.36
KM SD (logged)	2.042	95% Critical H Value (KM-Log)	3.7
KM Standard Error of Mean (logged)	0.325		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.497	Mean in Log Scale	-2.045
SD in Original Scale	0.728	SD in Log Scale	2.039

95% t UCL (Assumes normality)	0.689	95% H-Stat UCL	3.405

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	0.994	95% GROS Adjusted Gamma UCL	0.765
95% Adjusted Gamma KM-UCL	0.765		

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.

Anthracene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	36
Number of Detects	26	Number of Non-Detects	15
Number of Distinct Detects	23	Number of Distinct Non-Detects	14
Minimum Detect	0.0033	Minimum Non-Detect	0.004
Maximum Detect	4.4	Maximum Non-Detect	0.049
Variance Detects	0.722	Percent Non-Detects	36.59%
Mean Detects	0.29	SD Detects	0.849
Median Detects	0.0635	CV Detects	2.932
Skewness Detects	4.891	Kurtosis Detects	24.49
Mean of Logged Detects	-2.552	SD of Logged Detects	1.469

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.32	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Normal at 5% Significance Level	

Lilliefors Test Statistic	0.39	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.174	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	0.186	Standard Error of Mean	0.108
SD	0.677	95% KM (BCA) UCL	0.403
95% KM (t) UCL	0.367	95% KM (Percentile Bootstrap) UCL	0.391
95% KM (z) UCL	0.363	95% KM Bootstrap t UCL	1.088
90% KM Chebyshev UCL	0.509	95% KM Chebyshev UCL	0.656
97.5% KM Chebyshev UCL	0.859	99% KM Chebyshev UCL	1.259

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.913	Anderson-Darling GOF Test	
5% A-D Critical Value	0.812	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.196	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.182	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)	0.486	k star (bias corrected MLE)	0.455
Theta hat (MLE)	0.596	Theta star (bias corrected MLE)	0.636
nu hat (MLE)	25.27	nu star (bias corrected)	23.69
MLE Mean (bias corrected)	0.29	MLE Sd (bias corrected)	0.429

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0751	nu hat (KM)	6.158
Approximate Chi Square Value (6.16, α)	1.721	Adjusted Chi Square Value (6.16, β)	1.637
95% Gamma Approximate KM-UCL (use when n>=50)	0.664	95% Gamma Adjusted KM-UCL (use when n<50)	0.698
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	0.0033	Mean	0.187
Maximum	4.4	Median	0.025
SD	0.685	CV	3.656
k hat (MLE)	0.404	k star (bias corrected MLE)	0.39
Theta hat (MLE)	0.464	Theta star (bias corrected MLE)	0.48
nu hat (MLE)	33.09	nu star (bias corrected)	32
MLE Mean (bias corrected)	0.187	MLE Sd (bias corrected)	0.3
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (32.00, α)	20.07	Adjusted Chi Square Value (32.00, β)	19.73
95% Gamma Approximate UCL (use when n>=50)	0.299	95% Gamma Adjusted UCL (use when n<50)	0.304

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.97	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.92	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0987	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.174	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	0.185	Mean in Log Scale	-3.62
SD in Original Scale	0.686	SD in Log Scale	1.852
95% t UCL (assumes normality of ROS data)	0.366	95% Percentile Bootstrap UCL	0.393
95% BCA Bootstrap UCL	0.513	95% Bootstrap t UCL	1.055
95% H-UCL (Log ROS)	0.406		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.646	95% H-UCL (KM -Log)	0.418
KM SD (logged)	1.871	95% Critical H Value (KM-Log)	3.459

KM Standard Error of Mean (logged)	0.302

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.186	Mean in Log Scale	-3.546
SD in Original Scale	0.686	SD in Log Scale	1.828
95% t UCL (Assumes normality)	0.367	95% H-Stat UCL	0.409

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	0.656

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.

Benzo[a]anthracene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	35
Number of Detects	25	Number of Non-Detects	16
Number of Distinct Detects	24	Number of Distinct Non-Detects	13
Minimum Detect	0.0048	Minimum Non-Detect	0.004
Maximum Detect	0.29	Maximum Non-Detect	0.049
Variance Detects	0.00622	Percent Non-Detects	39.02%
Mean Detects	0.0698	SD Detects	0.0789
Median Detects	0.045	CV Detects	1.129
Skewness Detects	1.651	Kurtosis Detects	2.165

Mean of Logged Detects	-3.298	SD of Logged Detects	1.22

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.782	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.918	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.205	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.177	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	0.045	Standard Error of Mean	0.0108
SD	0.068	95% KM (BCA) UCL	0.0643
95% KM (t) UCL	0.0632	95% KM (Percentile Bootstrap) UCL	0.0637
95% KM (z) UCL	0.0628	95% KM Bootstrap t UCL	0.071
90% KM Chebyshev UCL	0.0775	95% KM Chebyshev UCL	0.0922
97.5% KM Chebyshev UCL	0.113	99% KM Chebyshev UCL	0.153

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.392	Anderson-Darling GOF Test	
5% A-D Critical Value	0.777	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.13	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.18	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)	0.916	k star (bias corrected MLE)	0.833
Theta hat (MLE)	0.0762	Theta star (bias corrected MLE)	0.0839
nu hat (MLE)	45.81	nu star (bias corrected)	41.64
MLE Mean (bias corrected)	0.0698	MLE Sd (bias corrected)	0.0765

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.437	nu hat (KM)	35.87

Approximate Chi Square Value (35.87, α)	23.17	Adjusted Chi Square Value (35.87, β)	22.79
95% Gamma Approximate KM-UCL (use when n>=50)	0.0696	95% Gamma Adjusted KM-UCL (use when n<50)	0.0708

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	0.0048	Mean	0.0465
Maximum	0.29	Median	0.01
SD	0.0679	CV	1.46
k hat (MLE)	0.802	k star (bias corrected MLE)	0.76
Theta hat (MLE)	0.058	Theta star (bias corrected MLE)	0.0612
nu hat (MLE)	65.77	nu star (bias corrected)	62.29
MLE Mean (bias corrected)	0.0465	MLE Sd (bias corrected)	0.0533
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (62.29, α)	45.13	Adjusted Chi Square Value (62.29, β)	44.6
95% Gamma Approximate UCL (use when n>=50)	0.0642	95% Gamma Adjusted UCL (use when n<50)	0.0649

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.964	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.918	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0842	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.177	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	0.0442	Mean in Log Scale	-4.219
SD in Original Scale	0.0692	SD in Log Scale	1.543
95% t UCL (assumes normality of ROS data)	0.0624	95% Percentile Bootstrap UCL	0.0634
95% BCA Bootstrap UCL	0.0665	95% Bootstrap t UCL	0.0704
95% H-UCL (Log ROS)	0.101		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-4.059	95% H-UCL (KM -Log)	0.0795
KM SD (logged)	1.363	95% Critical H Value (KM-Log)	2.78
KM Standard Error of Mean (logged)	0.222		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0456	Mean in Log Scale	-4.024
SD in Original Scale	0.0685	SD in Log Scale	1.403
95% t UCL (Assumes normality)	0.0636	95% H-Stat UCL	0.0897

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	0.0643	95% GROS Adjusted Gamma UCL	0.0649
95% Adjusted Gamma KM-UCL	0.0708		

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.

Benzo[a]pyrene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	29
Number of Detects	17	Number of Non-Detects	24
Number of Distinct Detects	16	Number of Distinct Non-Detects	19
Minimum Detect	0.004	Minimum Non-Detect	0.004

Maximum Detect	0.18	Maximum Non-Detect	0.049
Variance Detects	0.00209	Percent Non-Detects	58.54%
Mean Detects	0.0372	SD Detects	0.0457
Median Detects	0.021	CV Detects	1.228
Skewness Detects	2.474	Kurtosis Detects	6.129
Mean of Logged Detects	-3.78	SD of Logged Detects	0.98

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.66	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.892	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.297	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	0.0186	Standard Error of Mean	0.00529
SD	0.0327	95% KM (BCA) UCL	0.0289
95% KM (t) UCL	0.0275	95% KM (Percentile Bootstrap) UCL	0.0276
95% KM (z) UCL	0.0273	95% KM Bootstrap t UCL	0.0382
90% KM Chebyshev UCL	0.0345	95% KM Chebyshev UCL	0.0417
97.5% KM Chebyshev UCL	0.0516	99% KM Chebyshev UCL	0.0712

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.634	Anderson-Darling GOF Test	
5% A-D Critical Value	0.763	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.167	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.214	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)	1.163	k star (bias corrected MLE)	0.997
Theta hat (MLE)	0.032	Theta star (bias corrected MLE)	0.0373

nu hat (MLE)	39.53	nu star (bias corrected)	33.88
MLE Mean (bias corrected)	0.0372	MLE Sd (bias corrected)	0.0372

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.324	nu hat (KM)	26.55
Approximate Chi Square Value (26.55, α)	15.8	Adjusted Chi Square Value (26.55, β)	15.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.0313	95% Gamma Adjusted KM-UCL (use when n<50)	0.0319

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	0.004	Mean	0.0213
Maximum	0.18	Median	0.01
SD	0.0319	CV	1.5
k hat (MLE)	1.354	k star (bias corrected MLE)	1.271
Theta hat (MLE)	0.0157	Theta star (bias corrected MLE)	0.0167
nu hat (MLE)	111	nu star (bias corrected)	104.3
MLE Mean (bias corrected)	0.0213	MLE Sd (bias corrected)	0.0189
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (104.26, α)	81.7	Adjusted Chi Square Value (104.26, β)	80.97
95% Gamma Approximate UCL (use when n>=50)	0.0271	95% Gamma Adjusted UCL (use when n<50)	0.0274

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.977	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.892	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.113	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	0.0173	Mean in Log Scale	-4.971
SD in Original Scale	0.0335	SD in Log Scale	1.241
95% t UCL (assumes normality of ROS data)	0.0262	95% Percentile Bootstrap UCL	0.0269
95% BCA Bootstrap UCL	0.0294	95% Bootstrap t UCL	0.0368
95% H-UCL (Log ROS)	0.0251		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-4.691	95% H-UCL (KM -Log)	0.023
KM SD (logged)	1.031	95% Critical H Value (KM-Log)	2.385
KM Standard Error of Mean (logged)	0.176		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0195	Mean in Log Scale	-4.61
SD in Original Scale	0.0328	SD in Log Scale	1.072
95% t UCL (Assumes normality)	0.0282	95% H-Stat UCL	0.0267

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	0.0275	95% GROS Adjusted Gamma UCL	0.0274
95% Adjusted Gamma KM-UCL	0.0319		

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.

Benzo[b]fluoranthene

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Pro-UCL Output Data

General Statistics

Total Number of Observations	41	Number of Distinct Observations	34
Number of Detects	28	Number of Non-Detects	13
Number of Distinct Detects	26	Number of Distinct Non-Detects	12
Minimum Detect	0.0067	Minimum Non-Detect	0.004
Maximum Detect	0.33	Maximum Non-Detect	0.043
Variance Detects	0.00597	Percent Non-Detects	31.71%
Mean Detects	0.0622	SD Detects	0.0773
Median Detects	0.0325	CV Detects	1.242
Skewness Detects	2.617	Kurtosis Detects	6.905
Mean of Logged Detects	-3.278	SD of Logged Detects	0.986

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.65	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.924	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.256	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	0.0444	Standard Error of Mean	0.0108
SD	0.068	95% KM (BCA) UCL	0.0642
95% KM (t) UCL	0.0626	95% KM (Percentile Bootstrap) UCL	0.0631
95% KM (z) UCL	0.0622	95% KM Bootstrap t UCL	0.0771
90% KM Chebyshev UCL	0.0769	95% KM Chebyshev UCL	0.0916
97.5% KM Chebyshev UCL	0.112	99% KM Chebyshev UCL	0.152

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.792	Anderson-Darling GOF Test	
5% A-D Critical Value	0.771	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.147	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.17	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)	1.134	k star (bias corrected MLE)	1.036
Theta hat (MLE)	0.0549	Theta star (bias corrected MLE)	0.0601
nu hat (MLE)	63.51	nu star (bias corrected)	58.04
MLE Mean (bias corrected)	0.0622	MLE Sd (bias corrected)	0.0611
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.426	nu hat (KM)	34.91
Approximate Chi Square Value (34.91, α)	22.4	Adjusted Chi Square Value (34.91, β)	22.03
95% Gamma Approximate KM-UCL (use when n>=50)	0.0692	95% Gamma Adjusted KM-UCL (use when n<50)	0.0704
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	0.0067	Mean	0.0457
Maximum	0.33	Median	0.021
SD	0.0681	CV	1.491
k hat (MLE)	0.948	k star (bias corrected MLE)	0.895
Theta hat (MLE)	0.0482	Theta star (bias corrected MLE)	0.0511
nu hat (MLE)	77.71	nu star (bias corrected)	73.36
MLE Mean (bias corrected)	0.0457	MLE Sd (bias corrected)	0.0483
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (73.36, α)	54.63	Adjusted Chi Square Value (73.36, β)	54.04
95% Gamma Approximate UCL (use when n>=50)	0.0613	95% Gamma Adjusted UCL (use when n<50)	0.062
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.974	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.924	Detected Data appear Lognormal at 5% Significance Level	

Lilliefors Test Statistic	0.0893	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	0.0442	Mean in Log Scale	-3.921
SD in Original Scale	0.0689	SD in Log Scale	1.271
95% t UCL (assumes normality of ROS data)	0.0623	95% Percentile Bootstrap UCL	0.0626
95% BCA Bootstrap UCL	0.0691	95% Bootstrap t UCL	0.0809
95% H-UCL (Log ROS)	0.076		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.917	95% H-UCL (KM -Log)	0.0751
KM SD (logged)	1.263	95% Critical H Value (KM-Log)	2.657
KM Standard Error of Mean (logged)	0.204		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0445	Mean in Log Scale	-3.941
SD in Original Scale	0.0688	SD in Log Scale	1.343
95% t UCL (Assumes normality)	0.0626	95% H-Stat UCL	0.0859

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 (Percentile Bootstrap) UCL	0.0631	95% GROS Adjusted Gamma UCL	0.062
95% Adjusted Gamma KM-UCL	0.0704		

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.

Benzo[g,h,i]perylene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	28
Number of Detects	10	Number of Non-Detects	31
Number of Distinct Detects	9	Number of Distinct Non-Detects	24
Minimum Detect	0.0071	Minimum Non-Detect	0.004
Maximum Detect	0.073	Maximum Non-Detect	0.049
Variance Detects	5.89E-04	Percent Non-Detects	75.61%
Mean Detects	0.0244	SD Detects	0.0243
Median Detects	0.013	CV Detects	0.996
Skewness Detects	1.654	Kurtosis Detects	1.224
Mean of Logged Detects	-4.052	SD of Logged Detects	0.8

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.68	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.323	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.28	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	0.00957	Standard Error of Mean	0.00238
SD	0.0143	95% KM (BCA) UCL	0.014
95% KM (t) UCL	0.0136	95% KM (Percentile Bootstrap) UCL	0.0138
95% KM (z) UCL	0.0135	95% KM Bootstrap t UCL	0.0197
90% KM Chebyshev UCL	0.0167	95% KM Chebyshev UCL	0.0199
97.5% KM Chebyshev UCL	0.0244	99% KM Chebyshev UCL	0.0333

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.021	Anderson-Darling GOF Test	
5% A-D Critical Value	0.738	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.274	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.271	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)	1.628	k star (bias corrected MLE)	1.206
Theta hat (MLE)	0.015	Theta star (bias corrected MLE)	0.0202
nu hat (MLE)	32.56	nu star (bias corrected)	24.13
MLE Mean (bias corrected)	0.0244	MLE Sd (bias corrected)	0.0222
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.449	nu hat (KM)	36.84
Approximate Chi Square Value (36.84, α)	23.95	Adjusted Chi Square Value (36.84, β)	23.57
95% Gamma Approximate KM-UCL (use when n>=50)	0.0147	95% Gamma Adjusted KM-UCL (use when n<50)	0.015
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	0.0071	Mean	0.0135
Maximum	0.073	Median	0.01
SD	0.0131	CV	0.97
k hat (MLE)	3.178	k star (bias corrected MLE)	2.961
Theta hat (MLE)	0.00425	Theta star (bias corrected MLE)	0.00456
nu hat (MLE)	260.6	nu star (bias corrected)	242.8
MLE Mean (bias corrected)	0.0135	MLE Sd (bias corrected)	0.00785
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (242.83, α)	207.7	Adjusted Chi Square Value (242.83, β)	206.6

95% Gamma Approximate UCL (use when n>=50)	0.0158	95% Gamma Adjusted UCL (use when n<50)	0.0159

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.849	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.242	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.28	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	0.00761	Mean in Log Scale	-5.681
SD in Original Scale	0.015	SD in Log Scale	1.073
95% t UCL (assumes normality of ROS data)	0.0116	95% Percentile Bootstrap UCL	0.0118
95% BCA Bootstrap UCL	0.0131	95% Bootstrap t UCL	0.0185
95% H-UCL (Log ROS)	0.00917		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-5.074	95% H-UCL (KM -Log)	0.0105
KM SD (logged)	0.743	95% Critical H Value (KM-Log)	2.093
KM Standard Error of Mean (logged)	0.133		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0107	Mean in Log Scale	-4.988
SD in Original Scale	0.0146	SD in Log Scale	0.855
95% t UCL (Assumes normality)	0.0145	95% H-Stat UCL	0.0132

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	0.0136	95% KM (% Bootstrap) UCL	0.0138

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.

Benzo[k]fluoranthene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	34
Number of Detects	24	Number of Non-Detects	17
Number of Distinct Detects	22	Number of Distinct Non-Detects	14
Minimum Detect	0.006	Minimum Non-Detect	0.004
Maximum Detect	0.12	Maximum Non-Detect	0.049
Variance Detects	6.57E-04	Percent Non-Detects	41.46%
Mean Detects	0.0259	SD Detects	0.0256
Median Detects	0.0185	CV Detects	0.989
Skewness Detects	2.652	Kurtosis Detects	7.835
Mean of Logged Detects	-3.95	SD of Logged Detects	0.733

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.68	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.249	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	0.0179	Standard Error of Mean	0.00349
SD	0.0217	95% KM (BCA) UCL	0.0241
95% KM (t) UCL	0.0237	95% KM (Percentile Bootstrap) UCL	0.0239

95% KM (z) UCL	0.0236	95% KM Bootstrap t UCL	0.0275
90% KM Chebyshev UCL	0.0283	95% KM Chebyshev UCL	0.0331
97.5% KM Chebyshev UCL	0.0397	99% KM Chebyshev UCL	0.0526

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.854	Anderson-Darling GOF Test	
5% A-D Critical Value	0.757	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.15	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.181	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)	1.826	k star (bias corrected MLE)	1.625
Theta hat (MLE)	0.0142	Theta star (bias corrected MLE)	0.016
nu hat (MLE)	87.63	nu star (bias corrected)	78.01
MLE Mean (bias corrected)	0.0259	MLE Sd (bias corrected)	0.0203

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.678	nu hat (KM)	55.61
Approximate Chi Square Value (55.61, α)	39.47	Adjusted Chi Square Value (55.61, β)	38.98
95% Gamma Approximate KM-UCL (use when n>=50)	0.0252	95% Gamma Adjusted KM-UCL (use when n<50)	0.0255

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	0.006	Mean	0.0193
Maximum	0.12	Median	0.01
SD	0.021	CV	1.087
k hat (MLE)	1.964	k star (bias corrected MLE)	1.837
Theta hat (MLE)	0.00984	Theta star (bias corrected MLE)	0.0105

nu hat (MLE)	161.1	nu star (bias corrected)	150.6
MLE Mean (bias corrected)	0.0193	MLE Sd (bias corrected)	0.0143
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (150.61, α)	123.2	Adjusted Chi Square Value (150.61, β)	122.3
95% Gamma Approximate UCL (use when n>=50)	0.0236	95% Gamma Adjusted UCL (use when n<50)	0.0238

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.958	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.916	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0907	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.181	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	0.0174	Mean in Log Scale	-4.507
SD in Original Scale	0.022	SD in Log Scale	0.908
95% t UCL (assumes normality of ROS data)	0.0232	95% Percentile Bootstrap UCL	0.0234
95% BCA Bootstrap UCL	0.0253	95% Bootstrap t UCL	0.0281
95% H-UCL (Log ROS)	0.023		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-4.47	95% H-UCL (KM -Log)	0.0232
KM SD (logged)	0.887	95% Critical H Value (KM-Log)	2.233
KM Standard Error of Mean (logged)	0.149		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0182	Mean in Log Scale	-4.487
SD in Original Scale	0.022	SD in Log Scale	0.985
95% t UCL (Assumes normality)	0.024	95% H-Stat UCL	0.0263

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	0.0237	95% GROS Adjusted Gamma UCL	0.0238
95% Adjusted Gamma KM-UCL	0.0255		

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.

Chrysene

General Statistics			
Total Number of Observations	41	Number of Distinct Observations	35
Number of Detects	33	Number of Non-Detects	8
Number of Distinct Detects	28	Number of Distinct Non-Detects	7
Minimum Detect	0.0036	Minimum Non-Detect	0.004
Maximum Detect	0.76	Maximum Non-Detect	0.049
Variance Detects	0.0223	Percent Non-Detects	19.51%
Mean Detects	0.114	SD Detects	0.149
Median Detects	0.06	CV Detects	1.304
Skewness Detects	2.95	Kurtosis Detects	10.82
Mean of Logged Detects	-2.863	SD of Logged Detects	1.302

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.679	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.234	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.154	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	0.0935	Standard Error of Mean	0.022
SD	0.139	95% KM (BCA) UCL	0.135
95% KM (t) UCL	0.13	95% KM (Percentile Bootstrap) UCL	0.131
95% KM (z) UCL	0.13	95% KM Bootstrap t UCL	0.154
90% KM Chebyshev UCL	0.159	95% KM Chebyshev UCL	0.189
97.5% KM Chebyshev UCL	0.231	99% KM Chebyshev UCL	0.312

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.363	Anderson-Darling GOF Test
5% A-D Critical Value	0.783	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.107	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.159	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)	0.847	k star (bias corrected MLE)	0.791
Theta hat (MLE)	0.135	Theta star (bias corrected MLE)	0.145
nu hat (MLE)	55.93	nu star (bias corrected)	52.18
MLE Mean (bias corrected)	0.114	MLE Sd (bias corrected)	0.129

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.455	nu hat (KM)	37.34
Approximate Chi Square Value (37.34, α)	24.35	Adjusted Chi Square Value (37.34, β)	23.97
95% Gamma Approximate KM-UCL (use when n>=50)	0.143	95% Gamma Adjusted KM-UCL (use when n<50)	0.146

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	0.0036	Mean	0.094
Maximum	0.76	Median	0.053
SD	0.14	CV	1.487
k hat (MLE)	0.718	k star (bias corrected MLE)	0.682
Theta hat (MLE)	0.131	Theta star (bias corrected MLE)	0.138
nu hat (MLE)	58.87	nu star (bias corrected)	55.89
MLE Mean (bias corrected)	0.094	MLE Sd (bias corrected)	0.114
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (55.89, α)	39.71	Adjusted Chi Square Value (55.89, β)	39.21
95% Gamma Approximate UCL (use when n>=50)	0.132	95% Gamma Adjusted UCL (use when n<50)	0.134

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.969	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.931	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.154	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	0.0935	Mean in Log Scale	-3.291
SD in Original Scale	0.14	SD in Log Scale	1.478
95% t UCL (assumes normality of ROS data)	0.13	95% Percentile Bootstrap UCL	0.132
95% BCA Bootstrap UCL	0.143	95% Bootstrap t UCL	0.153
95% H-UCL (Log ROS)	0.22		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.322	95% H-UCL (KM -Log)	0.228
KM SD (logged)	1.507	95% Critical H Value (KM-Log)	2.965
KM Standard Error of Mean (logged)	0.242		

DL/2 Statistics

DL/2 Normal DL/2 Log-Transformed

Mean in Original Scale	0.094	Mean in Log Scale	-3.294
SD in Original Scale	0.14	SD in Log Scale	1.521
95% t UCL (Assumes normality)	0.131	95% H-Stat UCL	0.242

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	0.189	95% GROS Adjusted Gamma UCL	0.134
95% Adjusted Gamma KM-UCL	0.146		

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.

Dibenz(a,h)anthracene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	31
Number of Detects	14	Number of Non-Detects	27
Number of Distinct Detects	12	Number of Distinct Non-Detects	21
Minimum Detect	0.0039	Minimum Non-Detect	0.004
Maximum Detect	0.051	Maximum Non-Detect	0.049
Variance Detects	1.70E-04	Percent Non-Detects	65.85%
Mean Detects	0.0151	SD Detects	0.013
Median Detects	0.0101	CV Detects	0.861
Skewness Detects	1.807	Kurtosis Detects	3.654
Mean of Logged Detects	-4.483	SD of Logged Detects	0.778

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.799	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.228	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.237	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	0.00841	Standard Error of Mean	0.00151
SD	0.00903	95% KM (BCA) UCL	0.0113
95% KM (t) UCL	0.0109	95% KM (Percentile Bootstrap) UCL	0.011
95% KM (z) UCL	0.0109	95% KM Bootstrap t UCL	0.0124
90% KM Chebyshev UCL	0.0129	95% KM Chebyshev UCL	0.015
97.5% KM Chebyshev UCL	0.0178	99% KM Chebyshev UCL	0.0234

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.431	Anderson-Darling GOF Test	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.192	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.232	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)	1.864	k star (bias corrected MLE)	1.512
Theta hat (MLE)	0.00811	Theta star (bias corrected MLE)	0.01
nu hat (MLE)	52.19	nu star (bias corrected)	42.34
MLE Mean (bias corrected)	0.0151	MLE Sd (bias corrected)	0.0123

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.866	nu hat (KM)	71.02
Approximate Chi Square Value (71.02, α)	52.62	Adjusted Chi Square Value (71.02, β)	52.04
95% Gamma Approximate KM-UCL (use when n>=50)	0.0113	95% Gamma Adjusted KM-UCL (use when n<50)	0.0115

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	0.0039	Mean	0.0117
Maximum	0.051	Median	0.01
SD	0.00782	CV	0.666
k hat (MLE)	4.343	k star (bias corrected MLE)	4.041
Theta hat (MLE)	0.00271	Theta star (bias corrected MLE)	0.00291
nu hat (MLE)	356.1	nu star (bias corrected)	331.4
MLE Mean (bias corrected)	0.0117	MLE Sd (bias corrected)	0.00584
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (331.38, α)	290.2	Adjusted Chi Square Value (331.38, β)	288.8
95% Gamma Approximate UCL (use when n>=50)	0.0134	95% Gamma Adjusted UCL (use when n<50)	0.0135

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.953	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.16	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	0.00772	Mean in Log Scale	-5.22
SD in Original Scale	0.00924	SD in Log Scale	0.743
95% t UCL (assumes normality of ROS data)	0.0101	95% Percentile Bootstrap UCL	0.0103
95% BCA Bootstrap UCL	0.0108	95% Bootstrap t UCL	0.0122
95% H-UCL (Log ROS)	0.00911		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-5.075	95% H-UCL (KM -Log)	0.00963

KM SD (logged)	0.664	95% Critical H Value (KM-Log)	2.023
KM Standard Error of Mean (logged)	0.118		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00943	Mean in Log Scale	-5.008
SD in Original Scale	0.00959	SD in Log Scale	0.795
95% t UCL (Assumes normality)	0.012	95% H-Stat UCL	0.012

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	0.0109	95% KM (Percentile Bootstrap) UCL	0.011

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.

Fluoranthene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	37
Number of Detects	34	Number of Non-Detects	7
Number of Distinct Detects	31	Number of Distinct Non-Detects	7
Minimum Detect	0.0038	Minimum Non-Detect	0.004
Maximum Detect	2.3	Maximum Non-Detect	0.027
Variance Detects	0.277	Percent Non-Detects	17.07%
Mean Detects	0.353	SD Detects	0.526
Median Detects	0.0785	CV Detects	1.489

Skewness Detects	2.23	Kurtosis Detects	5.259
Mean of Logged Detects	-2.191	SD of Logged Detects	1.689

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.696	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.253	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.152	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	0.294	Standard Error of Mean	0.0777
SD	0.49	95% KM (BCA) UCL	0.436
95% KM (t) UCL	0.425	95% KM (Percentile Bootstrap) UCL	0.427
95% KM (z) UCL	0.422	95% KM Bootstrap t UCL	0.48
90% KM Chebyshev UCL	0.527	95% KM Chebyshev UCL	0.633
97.5% KM Chebyshev UCL	0.779	99% KM Chebyshev UCL	1.067

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.866	Anderson-Darling GOF Test	
5% A-D Critical Value	0.807	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.192	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.159	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)	0.545	k star (bias corrected MLE)	0.516
Theta hat (MLE)	0.649	Theta star (bias corrected MLE)	0.685
nu hat (MLE)	37.04	nu star (bias corrected)	35.11
MLE Mean (bias corrected)	0.353	MLE Sd (bias corrected)	0.492

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.36	nu hat (KM)	29.53
Approximate Chi Square Value (29.53, α)	18.12	Adjusted Chi Square Value (29.53, β)	17.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.479	95% Gamma Adjusted KM-UCL (use when n<50)	0.488

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	0.0038	Mean	0.295
Maximum	2.3	Median	0.055
SD	0.496	CV	1.681
k hat (MLE)	0.465	k star (bias corrected MLE)	0.447
Theta hat (MLE)	0.634	Theta star (bias corrected MLE)	0.659
nu hat (MLE)	38.13	nu star (bias corrected)	36.67
MLE Mean (bias corrected)	0.295	MLE Sd (bias corrected)	0.441
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (36.67, α)	23.81	Adjusted Chi Square Value (36.67, β)	23.43
95% Gamma Approximate UCL (use when n>=50)	0.454	95% Gamma Adjusted UCL (use when n<50)	0.461

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.963	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.933	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.129	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.152	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	0.294	Mean in Log Scale	-2.739
SD in Original Scale	0.496	SD in Log Scale	1.969
95% t UCL (assumes normality of ROS data)	0.424	95% Percentile Bootstrap UCL	0.422
95% BCA Bootstrap UCL	0.458	95% Bootstrap t UCL	0.483

95% H-UCL (Log ROS)	1.377

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.727	95% H-UCL (KM -Log)	1.254
KM SD (logged)	1.934	95% Critical H Value (KM-Log)	3.546
KM Standard Error of Mean (logged)	0.308		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.294	Mean in Log Scale	-2.725
SD in Original Scale	0.496	SD in Log Scale	1.964
95% t UCL (Assumes normality)	0.425	95% H-Stat UCL	1.373

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	0.779

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.

Fluorene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	36
Number of Detects	36	Number of Non-Detects	5
Number of Distinct Detects	31	Number of Distinct Non-Detects	5
Minimum Detect	0.028	Minimum Non-Detect	0.004

Maximum Detect	11	Maximum Non-Detect	0.049
Variance Detects	8.961	Percent Non-Detects	12.20%
Mean Detects	1.902	SD Detects	2.994
Median Detects	0.835	CV Detects	1.574
Skewness Detects	2.251	Kurtosis Detects	4.203
Mean of Logged Detects	-0.635	SD of Logged Detects	1.885

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.631	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.935	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.289	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	1.671	Standard Error of Mean	0.449
SD	2.834	95% KM (BCA) UCL	2.393
95% KM (t) UCL	2.427	95% KM (Percentile Bootstrap) UCL	2.445
95% KM (z) UCL	2.409	95% KM Bootstrap t UCL	2.81
90% KM Chebyshev UCL	3.018	95% KM Chebyshev UCL	3.628
97.5% KM Chebyshev UCL	4.474	99% KM Chebyshev UCL	6.138

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.853	Anderson-Darling GOF Test	
5% A-D Critical Value	0.813	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.131	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.155	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)	0.497	k star (bias corrected MLE)	0.475
Theta hat (MLE)	3.823	Theta star (bias corrected MLE)	4.008

nu hat (MLE)	35.82	nu star (bias corrected)	34.17
MLE Mean (bias corrected)	1.902	MLE Sd (bias corrected)	2.761

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.347	nu hat (KM)	28.49
Approximate Chi Square Value (28.49, α)	17.31	Adjusted Chi Square Value (28.49, β)	16.99
95% Gamma Approximate KM-UCL (use when n>=50)	2.75	95% Gamma Adjusted KM-UCL (use when n<50)	2.801

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	1.671
Maximum	11	Median	0.7
SD	2.869	CV	1.717
k hat (MLE)	0.403	k star (bias corrected MLE)	0.389
Theta hat (MLE)	4.15	Theta star (bias corrected MLE)	4.291
nu hat (MLE)	33.01	nu star (bias corrected)	31.93
MLE Mean (bias corrected)	1.671	MLE Sd (bias corrected)	2.678
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (31.93, α)	20.02	Adjusted Chi Square Value (31.93, β)	19.67
95% Gamma Approximate UCL (use when n>=50)	2.665	95% Gamma Adjusted UCL (use when n<50)	2.712

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.908	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.935	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.147	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.148	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	1.671	Mean in Log Scale	-1.114
SD in Original Scale	2.869	SD in Log Scale	2.199
95% t UCL (assumes normality of ROS data)	2.426	95% Percentile Bootstrap UCL	2.411
95% BCA Bootstrap UCL	2.569	95% Bootstrap t UCL	2.747
95% H-UCL (Log ROS)	14.43		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-1.199	95% H-UCL (KM -Log)	19.98
KM SD (logged)	2.319	95% Critical H Value (KM-Log)	4.1
KM Standard Error of Mean (logged)	0.368		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.671	Mean in Log Scale	-1.144
SD in Original Scale	2.869	SD in Log Scale	2.259
95% t UCL (Assumes normality)	2.426	95% H-Stat UCL	17.15

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 (Chebyshev) UCL	3.628	95% GROS Adjusted Gamma UCL	2.712
95% Adjusted Gamma KM-UCL	2.801		

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.

Indeno[1,2,3-cd]pyrene

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Pro-UCL Output Data

General Statistics			
Total Number of Observations	41	Number of Distinct Observations	31
Number of Detects	17	Number of Non-Detects	24
Number of Distinct Detects	16	Number of Distinct Non-Detects	20
Minimum Detect	0.0041	Minimum Non-Detect	0.004
Maximum Detect	0.084	Maximum Non-Detect	0.049
Variance Detects	4.26E-04	Percent Non-Detects	58.54%
Mean Detects	0.021	SD Detects	0.0206
Median Detects	0.015	CV Detects	0.985
Skewness Detects	2.339	Kurtosis Detects	5.42
Mean of Logged Detects	-4.172	SD of Logged Detects	0.755
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.688	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.892	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.302	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	0.012	Standard Error of Mean	0.00248
SD	0.0152	95% KM (BCA) UCL	0.016
95% KM (t) UCL	0.0162	95% KM (Percentile Bootstrap) UCL	0.0163
95% KM (z) UCL	0.0161	95% KM Bootstrap t UCL	0.0198
90% KM Chebyshev UCL	0.0195	95% KM Chebyshev UCL	0.0228
97.5% KM Chebyshev UCL	0.0275	99% KM Chebyshev UCL	0.0367
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.837	Anderson-Darling GOF Test	
5% A-D Critical Value	0.752	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.215	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.212	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)	1.78	k star (bias corrected MLE)	1.505
Theta hat (MLE)	0.0118	Theta star (bias corrected MLE)	0.0139
nu hat (MLE)	60.51	nu star (bias corrected)	51.17
MLE Mean (bias corrected)	0.021	MLE Sd (bias corrected)	0.0171
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.63	nu hat (KM)	51.66
Approximate Chi Square Value (51.66, α)	36.15	Adjusted Chi Square Value (51.66, β)	35.68
95% Gamma Approximate KM-UCL (use when n>=50)	0.0172	95% Gamma Adjusted KM-UCL (use when n<50)	0.0174
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	0.0041	Mean	0.0145
Maximum	0.084	Median	0.01
SD	0.0142	CV	0.974
k hat (MLE)	2.722	k star (bias corrected MLE)	2.539
Theta hat (MLE)	0.00534	Theta star (bias corrected MLE)	0.00573
nu hat (MLE)	223.2	nu star (bias corrected)	208.2
MLE Mean (bias corrected)	0.0145	MLE Sd (bias corrected)	0.00913
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (208.20, α)	175.8	Adjusted Chi Square Value (208.20, β)	174.7
95% Gamma Approximate UCL (use when n>=50)	0.0172	95% Gamma Adjusted UCL (use when n<50)	0.0173
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.951	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.892	Detected Data appear Lognormal at 5% Significance Level	

Lilliefors Test Statistic	0.156	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	0.0111	Mean in Log Scale	-4.993
SD in Original Scale	0.0156	SD in Log Scale	0.897
95% t UCL (assumes normality of ROS data)	0.0152	95% Percentile Bootstrap UCL	0.0154
95% BCA Bootstrap UCL	0.0166	95% Bootstrap t UCL	0.0197
95% H-UCL (Log ROS)	0.014		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-4.819	95% H-UCL (KM -Log)	0.0144
KM SD (logged)	0.789	95% Critical H Value (KM-Log)	2.136
KM Standard Error of Mean (logged)	0.14		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0128	Mean in Log Scale	-4.774
SD in Original Scale	0.0154	SD in Log Scale	0.87
95% t UCL (Assumes normality)	0.0168	95% H-Stat UCL	0.0167

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	0.0162	95% KM (% Bootstrap) UCL	0.0163

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.

Naphthalene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	35
Number of Detects	39	Number of Non-Detects	2
Number of Distinct Detects	33	Number of Distinct Non-Detects	2
Minimum Detect	0.029	Minimum Non-Detect	0.004
Maximum Detect	40	Maximum Non-Detect	0.027
Variance Detects	96.8	Percent Non-Detects	4.88%
Mean Detects	6.567	SD Detects	9.839
Median Detects	1.5	CV Detects	1.498
Skewness Detects	2.001	Kurtosis Detects	3.554
Mean of Logged Detects	0.461	SD of Logged Detects	2.057

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.695	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.257	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.142	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	6.247	Standard Error of Mean	1.515
SD	9.577	95% KM (BCA) UCL	8.984
95% KM (t) UCL	8.798	95% KM (Percentile Bootstrap) UCL	8.996
95% KM (z) UCL	8.739	95% KM Bootstrap t UCL	9.541
90% KM Chebyshev UCL	10.79	95% KM Chebyshev UCL	12.85
97.5% KM Chebyshev UCL	15.71	99% KM Chebyshev UCL	21.32

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.583	Anderson-Darling GOF Test	
5% A-D Critical Value	0.823	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.137	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.15	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)	0.454	k star (bias corrected MLE)	0.436
Theta hat (MLE)	14.47	Theta star (bias corrected MLE)	15.07
nu hat (MLE)	35.39	nu star (bias corrected)	34
MLE Mean (bias corrected)	6.567	MLE Sd (bias corrected)	9.947

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.426	nu hat (KM)	34.89
Approximate Chi Square Value (34.89, α)	22.38	Adjusted Chi Square Value (34.89, β)	22.01
95% Gamma Approximate KM-UCL (use when n>=50)	9.74	95% Gamma Adjusted KM-UCL (use when n<50)	9.902

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	6.247
Maximum	40	Median	1.4
SD	9.695	CV	1.552
k hat (MLE)	0.406	k star (bias corrected MLE)	0.392
Theta hat (MLE)	15.4	Theta star (bias corrected MLE)	15.93
nu hat (MLE)	33.26	nu star (bias corrected)	32.16
MLE Mean (bias corrected)	6.247	MLE Sd (bias corrected)	9.975
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (32.16, α)	20.2	Adjusted Chi Square Value (32.16, β)	19.85
95% Gamma Approximate UCL (use when n>=50)	9.947	95% Gamma Adjusted UCL (use when n<50)	10.12

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.943	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.939	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.104	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.142	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	6.247	Mean in Log Scale	0.223
SD in Original Scale	9.695	SD in Log Scale	2.269
95% t UCL (assumes normality of ROS data)	8.797	95% Percentile Bootstrap UCL	8.837
95% BCA Bootstrap UCL	9.162	95% Bootstrap t UCL	9.61
95% H-UCL (Log ROS)	69.52		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	0.169	95% H-UCL (KM -Log)	91.33
KM SD (logged)	2.362	95% Critical H Value (KM-Log)	4.163
KM Standard Error of Mean (logged)	0.374		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	6.247	Mean in Log Scale	0.182
SD in Original Scale	9.696	SD in Log Scale	2.371
95% t UCL (Assumes normality)	8.797	95% H-Stat UCL	95.31
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	12.85	95% GROS Adjusted Gamma UCL	10.12

95% Adjusted Gamma KM-UCL	9.902

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.

Phenanthrene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	38
		Number of Missing Observations	0
Minimum	0.0053	Mean	1.239
Maximum	6.3	Median	0.38
SD	1.663	Std. Error of Mean	0.26
Coefficient of Variation	1.342	Skewness	1.503

Normal GOF Test

Shapiro Wilk Test Statistic	0.738	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.245	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	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	1.676	95% Adjusted-CLT UCL (Chen-1995)	1.731
		95% Modified-t UCL (Johnson-1978)	1.687

Gamma GOF Test

A-D Test Statistic	0.655	Anderson-Darling Gamma GOF Test	

5% A-D Critical Value	0.812	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.112	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.146	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.512	k star (bias corrected MLE)	0.49
Theta hat (MLE)	2.422	Theta star (bias corrected MLE)	2.527
nu hat (MLE)	41.95	nu star (bias corrected)	40.21
MLE Mean (bias corrected)	1.239	MLE Sd (bias corrected)	1.77
		Approximate Chi Square Value (0.05)	26.68
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	26.28
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	1.868	95% Adjusted Gamma UCL (use when n<50)	1.896
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.946	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0892	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-5.24	Mean of logged Data	-1.023
Maximum of Logged Data	1.841	SD of logged Data	1.906
Assuming Lognormal Distribution			
95% H-UCL	6.368	90% Chebyshev (MVUE) UCL	4.45
95% Chebyshev (MVUE) UCL	5.57	97.5% Chebyshev (MVUE) UCL	7.124
99% Chebyshev (MVUE) UCL	10.18		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.666	95% Jackknife UCL	1.676
95% Standard Bootstrap UCL	1.669	95% Bootstrap-t UCL	1.776
95% Hall's Bootstrap UCL	1.712	95% Percentile Bootstrap UCL	1.685
95% BCA Bootstrap UCL	1.748		
90% Chebyshev(Mean, Sd) UCL	2.018	95% Chebyshev(Mean, Sd) UCL	2.371
97.5% Chebyshev(Mean, Sd) UCL	2.861	99% Chebyshev(Mean, Sd) UCL	3.823

Suggested UCL to Use

95% Adjusted Gamma UCL	1.896

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.

Pyrene

General Statistics

Total Number of Observations	41	Number of Distinct Observations	36
Number of Detects	38	Number of Non-Detects	3
Number of Distinct Detects	33	Number of Distinct Non-Detects	3
Minimum Detect	0.0078	Minimum Non-Detect	0.004
Maximum Detect	1.5	Maximum Non-Detect	0.0049
Variance Detects	0.136	Percent Non-Detects	7.32%
Mean Detects	0.276	SD Detects	0.369
Median Detects	0.135	CV Detects	1.334
Skewness Detects	1.959	Kurtosis Detects	3.436
Mean of Logged Detects	-2.167	SD of Logged Detects	1.447

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.722	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.938	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.25	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	0.256	Standard Error of Mean	0.0565
SD	0.357	95% KM (BCA) UCL	0.366
95% KM (t) UCL	0.352	95% KM (Percentile Bootstrap) UCL	0.349
95% KM (z) UCL	0.349	95% KM Bootstrap t UCL	0.388
90% KM Chebyshev UCL	0.426	95% KM Chebyshev UCL	0.503
97.5% KM Chebyshev UCL	0.609	99% KM Chebyshev UCL	0.819
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.693	Anderson-Darling GOF Test	
5% A-D Critical Value	0.795	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.115	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)	0.688	k star (bias corrected MLE)	0.651
Theta hat (MLE)	0.402	Theta star (bias corrected MLE)	0.424
nu hat (MLE)	52.27	nu star (bias corrected)	49.48
MLE Mean (bias corrected)	0.276	MLE Sd (bias corrected)	0.342
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.515	nu hat (KM)	42.22
Approximate Chi Square Value (42.22, α)	28.33	Adjusted Chi Square Value (42.22, β)	27.91

95% Gamma Approximate KM-UCL (use when n>=50)	0.382	95% Gamma Adjusted KM-UCL (use when n<50)	0.388

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	0.0078	Mean	0.257
Maximum	1.5	Median	0.11
SD	0.361	CV	1.407
k hat (MLE)	0.623	k star (bias corrected MLE)	0.594
Theta hat (MLE)	0.412	Theta star (bias corrected MLE)	0.432
nu hat (MLE)	51.1	nu star (bias corrected)	48.69
MLE Mean (bias corrected)	0.257	MLE Sd (bias corrected)	0.333
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (48.69, α)	33.67	Adjusted Chi Square Value (48.69, β)	33.22
95% Gamma Approximate UCL (use when n>=50)	0.371	95% Gamma Adjusted UCL (use when n<50)	0.376

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.963	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.938	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0842	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	0.256	Mean in Log Scale	-2.412
SD in Original Scale	0.362	SD in Log Scale	1.648
95% t UCL (assumes normality of ROS data)	0.351	95% Percentile Bootstrap UCL	0.353
95% BCA Bootstrap UCL	0.368	95% Bootstrap t UCL	0.382
95% H-UCL (Log ROS)	0.793		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.413	95% H-UCL (KM -Log)	0.754
KM SD (logged)	1.628	95% Critical H Value (KM-Log)	3.126
KM Standard Error of Mean (logged)	0.258		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.256	Mean in Log Scale	-2.454
SD in Original Scale	0.362	SD in Log Scale	1.734
95% t UCL (Assumes normality)	0.351	95% H-Stat UCL	0.948

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	0.503	95% GROS Adjusted Gamma UCL	0.376
95% Adjusted Gamma KM-UCL	0.388		

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.

Total Organic Carbon - Quad

General Statistics

Total Number of Observations	41	Number of Distinct Observations	31
		Number of Missing Observations	0
Minimum	29000	Mean	162976
Maximum	350000	Median	140000

SD	90344	Std. Error of Mean	14109
Coefficient of Variation	0.554	Skewness	0.419

Normal GOF Test

Shapiro Wilk Test Statistic	0.938	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.137	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	186734	95% Adjusted-CLT UCL (Chen-1995)	187169
		95% Modified-t UCL (Johnson-1978)	186887

Gamma GOF Test

A-D Test Statistic	0.4	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.109	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.139	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.939	k star (bias corrected MLE)	2.74
Theta hat (MLE)	55456	Theta star (bias corrected MLE)	59480
nu hat (MLE)	241	nu star (bias corrected)	224.7
MLE Mean (bias corrected)	162976	MLE Sd (bias corrected)	98457
		Approximate Chi Square Value (0.05)	191
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	189.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	191728	95% Adjusted Gamma UCL (use when n<50)	192871

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Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.947	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	10.28	Mean of logged Data	11.82
Maximum of Logged Data	12.77	SD of logged Data	0.648

Assuming Lognormal Distribution			
95% H-UCL	206381	90% Chebyshev (MVUE) UCL	221591
95% Chebyshev (MVUE) UCL	246341	97.5% Chebyshev (MVUE) UCL	280694
99% Chebyshev (MVUE) UCL	348173		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs			
95% CLT UCL	186183	95% Jackknife UCL	186734
95% Standard Bootstrap UCL	185888	95% Bootstrap-t UCL	187405
95% Hall's Bootstrap UCL	187558	95% Percentile Bootstrap UCL	187122
95% BCA Bootstrap UCL	186293		
90% Chebyshev(Mean, Sd) UCL	205304	95% Chebyshev(Mean, Sd) UCL	224477
97.5% Chebyshev(Mean, Sd) UCL	251088	99% Chebyshev(Mean, Sd) UCL	303362

Suggested UCL to Use	
95% Student's-t UCL	186734

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.

DRO nC10-<nC25

General Statistics

Total Number of Observations	41	Number of Distinct Observations	37
		Number of Missing Observations	0
Minimum	42	Mean	18176
Maximum	85000	Median	8900
SD	21984	Std. Error of Mean	3433
Coefficient of Variation	1.209	Skewness	1.532

Normal GOF Test

Shapiro Wilk Test Statistic	0.785	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.205	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	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	23958	95% Adjusted-CLT UCL (Chen-1995)	24702
		95% Modified-t UCL (Johnson-1978)	24095

Gamma GOF Test

A-D Test Statistic	0.236	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.805	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0643	Kolmogrov-Smirnoff Gamma GOF Test
5% K-S Critical Value	0.145	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics			
k hat (MLE)	0.589	k star (bias corrected MLE)	0.562
Theta hat (MLE)	30859	Theta star (bias corrected MLE)	32332
nu hat (MLE)	48.3	nu star (bias corrected)	46.1
MLE Mean (bias corrected)	18176	MLE Sd (bias corrected)	24242
		Approximate Chi Square Value (0.05)	31.52
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	31.08

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	26583	95% Adjusted Gamma UCL (use when n<50)	26960

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.94	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.141	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	3.738	Mean of logged Data	8.756
Maximum of Logged Data	11.35	SD of logged Data	1.833

Assuming Lognormal Distribution			
95% H-UCL	91516	90% Chebyshev (MVUE) UCL	67569
95% Chebyshev (MVUE) UCL	84196	97.5% Chebyshev (MVUE) UCL	107274
99% Chebyshev (MVUE) UCL	152605		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	23824	95% Jackknife UCL	23958
95% Standard Bootstrap UCL	23689	95% Bootstrap-t UCL	25239
95% Hall's Bootstrap UCL	24697	95% Percentile Bootstrap UCL	23836
95% BCA Bootstrap UCL	24425		
90% Chebyshev(Mean, Sd) UCL	28476	95% Chebyshev(Mean, Sd) UCL	33142
97.5% Chebyshev(Mean, Sd) UCL	39617	99% Chebyshev(Mean, Sd) UCL	52337

Suggested UCL to Use

95% Adjusted Gamma UCL	26960

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.

RRO nC25-nC36

General Statistics

Total Number of Observations	41	Number of Distinct Observations	35
		Number of Missing Observations	0
Minimum	500	Mean	7444
Maximum	26000	Median	6800
SD	6178	Std. Error of Mean	964.8
Coefficient of Variation	0.83	Skewness	1.245

Normal GOF Test

Shapiro Wilk Test Statistic	0.876	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.134	Lilliefors GOF Test
5% Lilliefors Critical Value	0.138	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	9068	95% Adjusted-CLT UCL (Chen-1995)	9231
		95% Modified-t UCL (Johnson-1978)	9100

Gamma GOF Test

A-D Test Statistic	0.311	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.768	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.093	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)	1.426	k star (bias corrected MLE)	1.338
Theta hat (MLE)	5218	Theta star (bias corrected MLE)	5562
nu hat (MLE)	117	nu star (bias corrected)	109.7
MLE Mean (bias corrected)	7444	MLE Sd (bias corrected)	6434
		Approximate Chi Square Value (0.05)	86.56
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	85.81

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	9437	95% Adjusted Gamma UCL (use when n<50)	9519

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.958	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.133	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	6.215	Mean of logged Data	8.525
Maximum of Logged Data	10.17	SD of logged Data	0.977

Assuming Lognormal Distribution

95% H-UCL	11647	90% Chebyshev (MVUE) UCL	12243
95% Chebyshev (MVUE) UCL	14168	97.5% Chebyshev (MVUE) UCL	16839
99% Chebyshev (MVUE) UCL	22087		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	9031	95% Jackknife UCL	9068
95% Standard Bootstrap UCL	9006	95% Bootstrap-t UCL	9344
95% Hall's Bootstrap UCL	9215	95% Percentile Bootstrap UCL	8992
95% BCA Bootstrap UCL	9196		
90% Chebyshev(Mean, Sd) UCL	10338	95% Chebyshev(Mean, Sd) UCL	11649
97.5% Chebyshev(Mean, Sd) UCL	13469	99% Chebyshev(Mean, Sd) UCL	17043

Suggested UCL to Use

95% Student's-t UCL	9068

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.

DRO nC10-<nC25-SG

General Statistics

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Pro-UCL Output Data

Total Number of Observations	41	Number of Distinct Observations	36
		Number of Missing Observations	0
Minimum	14	Mean	15570
Maximum	75000	Median	8000
SD	19458	Std. Error of Mean	3039
Coefficient of Variation	1.25	Skewness	1.64

Normal GOF Test

Shapiro Wilk Test Statistic	0.77	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.232	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	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	20687	95% Adjusted-CLT UCL (Chen-1995)	21400
		95% Modified-t UCL (Johnson-1978)	20817

Gamma GOF Test

A-D Test Statistic	0.183	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.808	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.069	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.145	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.55	k star (bias corrected MLE)	0.526
Theta hat (MLE)	28326	Theta star (bias corrected MLE)	29617
nu hat (MLE)	45.07	nu star (bias corrected)	43.11
MLE Mean (bias corrected)	15570	MLE Sd (bias corrected)	21474
		Approximate Chi Square Value (0.05)	29.05

Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	28.63
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	23102	95% Adjusted Gamma UCL (use when n<50)	23442
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.932	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.142	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.639	Mean of logged Data	8.514
Maximum of Logged Data	11.23	SD of logged Data	1.979
Assuming Lognormal Distribution			
95% H-UCL	109381	90% Chebyshev (MVUE) UCL	72011
95% Chebyshev (MVUE) UCL	90517	97.5% Chebyshev (MVUE) UCL	116203
99% Chebyshev (MVUE) UCL	166657		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	20569	95% Jackknife UCL	20687
95% Standard Bootstrap UCL	20496	95% Bootstrap-t UCL	22022
95% Hall's Bootstrap UCL	21246	95% Percentile Bootstrap UCL	20681
95% BCA Bootstrap UCL	20958		
90% Chebyshev(Mean, Sd) UCL	24687	95% Chebyshev(Mean, Sd) UCL	28816
97.5% Chebyshev(Mean, Sd) UCL	34548	99% Chebyshev(Mean, Sd) UCL	45806

Suggested UCL to Use
95% Adjusted Gamma UCL 23442

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.

RRO nC25-nC36-SG

General Statistics

Total Number of Observations	41	Number of Distinct Observations	36
		Number of Missing Observations	0
Minimum	150	Mean	4072
Maximum	18000	Median	3200
SD	4391	Std. Error of Mean	685.8
Coefficient of Variation	1.078	Skewness	1.879

Normal GOF Test

Shapiro Wilk Test Statistic	0.767	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.195	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	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	5227	95% Adjusted-CLT UCL (Chen-1995)	5415
		95% Modified-t UCL (Johnson-1978)	5261

Gamma GOF Test

A-D Test Statistic	0.485	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.778	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.108	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.142	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.016	k star (bias corrected MLE)	0.958
Theta hat (MLE)	4007	Theta star (bias corrected MLE)	4250
nu hat (MLE)	83.32	nu star (bias corrected)	78.56
MLE Mean (bias corrected)	4072	MLE Sd (bias corrected)	4160
		Approximate Chi Square Value (0.05)	59.14
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	58.53
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	5409	95% Adjusted Gamma UCL (use when n<50)	5466
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.126	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	5.011	Mean of logged Data	7.745
Maximum of Logged Data	9.798	SD of logged Data	1.163
Assuming Lognormal Distribution			
95% H-UCL	7240	90% Chebyshev (MVUE) UCL	7344
95% Chebyshev (MVUE) UCL	8667	97.5% Chebyshev (MVUE) UCL	10503
99% Chebyshev (MVUE) UCL	14110		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	5200	95% Jackknife UCL	5227
95% Standard Bootstrap UCL	5211	95% Bootstrap-t UCL	5596
95% Hall's Bootstrap UCL	5453	95% Percentile Bootstrap UCL	5253
95% BCA Bootstrap UCL	5397		
90% Chebyshev(Mean, Sd) UCL	6130	95% Chebyshev(Mean, Sd) UCL	7062
97.5% Chebyshev(Mean, Sd) UCL	8355	99% Chebyshev(Mean, Sd) UCL	10896

Suggested UCL to Use
95% Adjusted Gamma UCL 5466

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.

UCL Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation	7/2/2015 15:19
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

CPAH

Northeast Cape 2015 HHRA Update, Site 28 Drainage Basin
Pro-UCL Output Data

General Statistics			
Total Number of Observations	41	Number of Distinct Observations	41
		Number of Missing Observations	0
Minimum	0.0492	Mean	0.243
Maximum	0.899	Median	0.171
SD	0.201	Std. Error of Mean	0.0314
Coefficient of Variation	0.827	Skewness	1.941
Normal GOF Test			
Shapiro Wilk Test Statistic	0.783	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.208	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.138	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	0.295	95% Adjusted-CLT UCL (Chen-1995)	0.304
		95% Modified-t UCL (Johnson-1978)	0.297
Gamma GOF Test			
A-D Test Statistic	0.606	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.76	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.11	Kolmogrov-Smirnoff Gamma GOF Test	
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			
k hat (MLE)	1.978	k star (bias corrected MLE)	1.849
Theta hat (MLE)	0.123	Theta star (bias corrected MLE)	0.131
nu hat (MLE)	162.2	nu star (bias corrected)	151.6
MLE Mean (bias corrected)	0.243	MLE Sd (bias corrected)	0.178

		Approximate Chi Square Value (0.05)	124.2
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	123.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.296	95% Adjusted Gamma UCL (use when n<50)	0.298
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0953	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.138	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.013	Mean of logged Data	-1.69
Maximum of Logged Data	-0.106	SD of logged Data	0.746
Assuming Lognormal Distribution			
95% H-UCL	0.312	90% Chebyshev (MVUE) UCL	0.335
95% Chebyshev (MVUE) UCL	0.377	97.5% Chebyshev (MVUE) UCL	0.435
99% Chebyshev (MVUE) UCL	0.55		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.294	95% Jackknife UCL	0.295
95% Standard Bootstrap UCL	0.294	95% Bootstrap-t UCL	0.311
95% Hall's Bootstrap UCL	0.313	95% Percentile Bootstrap UCL	0.296
95% BCA Bootstrap UCL	0.308		
90% Chebyshev(Mean, Sd) UCL	0.337	95% Chebyshev(Mean, Sd) UCL	0.379
97.5% Chebyshev(Mean, Sd) UCL	0.438	99% Chebyshev(Mean, Sd) UCL	0.555

Suggested UCL to Use	
95% Adjusted Gamma UCL	0.298

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.

APPENDIX B
Calculation of Cancer Risks and Non-Cancer Hazards for Reasonable Maximum Exposure

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Calculations of Reasonable Maximum Exposure, Future Resident, Adult

Scenario Timeframe:	Future
Receptor Population:	On-Site Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	On-Site	Ingestion	Arsenic	7.137	mg/kg	2.59E-06	mg/kg-day	1.5E+00	(mg/kg-day)-1	4.E-06	7.54E-06	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.03
			Exp. Route Total								4.E-06					0.03
			Dermal	Arsenic	7.137	mg/kg	5.12E-07	mg/kg-day	1.5E+00	(mg/kg-day)-1	8.E-07	1.49E-06	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.005
			Exp. Route Total								8.E-07					0.005
		Exposure Point Total									5.E-06					0.03
	Exposure Medium Total										5.E-06					0.03
	Air	Inhalation of Fugitive Dust and Volatiles	Inhalation	Arsenic	8.84552E-09	mg/kg	2.24E-06	ug/m3	4.3E-03	(ug/m3)-1	1.E-08	6.54E-09	mg/m3	1.5E-05	mg/m3	0.0004
			Exp. Route Total								1.E-08					0.0004
		Exposure Point Total									1.E-08					0.0004
	Exposure Medium Total										1.E-08					0.0004
Medium Total											5.E-06					0.03
Exposure Medium Total											1.E-08					0.0004
Medium Total											5.E-06					0.03
Total of Receptor Risks Across All Media											5.E-06	Total of Receptor Hazards Across All Media				0.03

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Calculations of Reasonable Maximum Exposure, Future Resident, Child

Scenario Timeframe:	Future
Receptor Population:	On-Site Resident
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	On-Site	Ingestion	Arsenic	7.137	mg/kg	6.03E-06	mg/kg-day	1.5E+00	(mg/kg-day)-1	9.E-06	7.04E-05	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.2
			Exp. Route Total								9.E-06					0.2
			Dermal	Arsenic	7.137	mg/kg	5.07E-07	mg/kg-day	1.5E+00	(mg/kg-day)-1	8.E-07	5.91E-06	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.02
			Exp. Route Total								8.E-07					0.02
		Exposure Point Total									1.E-05					0.3
	Exposure Medium Total										1.E-05					0.3
	Air	Inhalation of Fugitive Dust and volatiles	Inhalation	Arsenic	8.84552E-09	mg/kg	5.61E-07	ug/m3	4.3E-03	(ug/m3)-1	2.E-09	6.54E-09	mg/m3	1.5E-05	mg/m3	0.0004
			Exp. Route Total								2.E-09					0.0004
		Exposure Point Total									2.E-09					0.0004
	Exposure Medium Total										2.E-09					0.0004
Medium Total											1.E-05					0.3
											Total of Receptor Risks Across All Media					1.E-05
																Total of Receptor Hazards Across All Media
																0.3

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Calculations of Reasonable Maximum Exposure, Seasonal Resident, Adult

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Seasonal Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	On-Site	Ingestion	Arsenic	7.137	mg/kg	8.62E-07	mg/kg-day	1.5E+00	(mg/kg-day)-1	1.E-06	2.51E-06	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.008
			Exp. Route Total								1.E-06					0.008
			Dermal	Arsenic	7.137	mg/kg	1.71E-07	mg/kg-day	1.5E+00	(mg/kg-day)-1	3.E-07	4.98E-07	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.002
			Exp. Route Total								3.E-07					0.002
		Exposure Point Total									2.E-06					0.01
	Exposure Medium Total										2.E-06					0.01
	Air	Inhalation of Fugitive Dust	Inhalation	Arsenic	8.84552E-09	mg/kg	4.95E-16	ug/m3	4.3E-03	(ug/m3)-1	2.E-18	1.44E-18	mg/m3	1.5E-05	mg/m3	0.0000000000001
			Exp. Route Total								2.E-18					0.0000000000001
		Exposure Point Total									2.E-18					0.0000000000001
	Exposure Medium Total										2.E-18					0.0000000000001
Medium Total											2.E-06					0.01
Total of Receptor Risks Across All Media											2.E-06	Total of Receptor Hazards Across All Media				0.01

Total of Receptor Risks Across All Media 2.E-06 Total of Receptor Hazards Across All Media 0.01

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Calculations of Reasonable Maximum Exposure, Seasonal Resident, Child

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Seasonal Resident
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	On-Site	Ingestion	Arsenic	7.14E+00	mg/kg	2.01E-06	mg/kg-day	1.5E+00	(mg/kg-day)-1	3.E-06	2.35E-05	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.08
			Exp. Route Total								3.E-06					0.08
			Dermal	Arsenic	7.14E+00	mg/kg	1.69E-07	mg/kg-day	1.5E+00	(mg/kg-day)-1	3.E-07	1.97E-06	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.007
			Exp. Route Total								3.E-07					0.007
		Exposure Point Total									3.E-06					0.08
	Exposure Medium Total										3.E-06					0.08
	Air	Inhalation of Fugitive Dust	Inhalation	Arsenic	8.84552E-09	mg/kg	1.24E-16	ug/m3	4.3E-03	(ug/m3)-1	5.E-19	1.44E-18	mg/m3	1.5E-05	mg/m3	0.0000000000001
			Exp. Route Total								5.E-19					0.0000000000001
		Exposure Point Total									5.E-19					0.0000000000001
	Exposure Medium Total										5.E-19					0.0000000000001
Medium Total											3.E-06					0.08
Total of Receptor Risks Across All Media											3.E-06	Total of Receptor Hazards Across All Media				0.08

Total of Receptor Risks Across All Media 3.E-06 Total of Receptor Hazards Across All Media 0.08

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Current/Future Seasonal Resident, Adult

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Seasonal Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	On-Site	Ingestion	Arsenic	30.54	mg/kg	3.69E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.E-06	1.08E-05	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.04
				Barium	111.7	mg/kg	1.35E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.93E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.0002
				Cadmium	0.34	mg/kg	4.11E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.20E-07	mg/kg-day	1.0E-03	1/(mg/kg-day)	0.0001
				Chromium	18.02	mg/kg	2.18E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.35E-06	mg/kg-day	1.5E+00	1/(mg/kg-day)	0.000004
				Lead	16.98	mg/kg	2.05E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.98E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Nickel	11.79	mg/kg	1.42E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.15E-06	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.0002
				Selenium	1.599	mg/kg	1.93E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.63E-07	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.0001
				Silver	0.113	mg/kg	1.36E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.98E-08	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.000008
				Vanadium	33.33	mg/kg	4.03E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.17E-05	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.002
				Zinc	93.75	mg/kg	1.13E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.30E-05	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.0001
				Mercury	0.101	mg/kg	1.22E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.56E-08	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.0001
				PCB-1260	0.121	mg/kg	1.46E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.E-08	4.26E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzene	0.032	mg/kg	3.86E-09	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	2.E-10	1.13E-08	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.000003
				Ethylbenzene	0.517	mg/kg	6.24E-08	mg/kg-day	1.1E-02	$(mg/kg\text{-}day)^{-1}$	7.E-10	1.82E-07	mg/kg-day	1.0E-01	1/(mg/kg-day)	0.000002
				m,p-xylene	3.825	mg/kg	4.62E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.35E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.000007
				o-xylene	1.708	mg/kg	2.06E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.02E-07	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.000003
				Total Xylenes	4.303	mg/kg	5.20E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.52E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.000008
				1-Methylnaphthalene	28.16	mg/kg	3.40E-06	mg/kg-day	2.9E-02	$(mg/kg\text{-}day)^{-1}$	1.E-07	9.92E-06	mg/kg-day	7.0E-02	1/(mg/kg-day)	0.0001
				2-Methylnaphthalene	33.54	mg/kg	4.05E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.18E-05	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.003
				Acenaphthene	1.54	mg/kg	1.86E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.42E-07	mg/kg-day	6.0E-02	1/(mg/kg-day)	0.000009
				Acenaphthylene	0.994	mg/kg	1.20E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.50E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Anthracene	0.656	mg/kg	7.92E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.31E-07	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.0000008
				Benzo[a]anthracene	0.0708	mg/kg	8.55E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.49E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[a]pyrene	0.0319	mg/kg	3.85E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.12E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[b]fluoranthene	0.0704	mg/kg	8.50E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.48E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[g,h,i]perylene	0.0138	mg/kg	1.67E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.86E-09	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[k]fluoranthene	0.0238	mg/kg	2.87E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	8.38E-09	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Chrysene	0.189	mg/kg	2.28E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.66E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Dibenz(a,h)anthracene	0.011	mg/kg	1.33E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.87E-09	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Fluoranthene	0.779	mg/kg	9.41E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.74E-07	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.000007
				Fluorene	3.628	mg/kg	4.38E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.28E-06	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.00003
				Indeno[1,2,3-cd]pyrene	0.0163	mg/kg	1.97E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.74E-09	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Naphthalene	12.85	mg/kg	1.55E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.53E-06	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.0002
				Phenanthrene	1.896	mg/kg	2.29E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.68E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Pyrene	0.503	mg/kg	6.07E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.77E-07	mg/kg-day	3.0E-02	1/(mg/kg-day)	0.000006
				CPAH	0.298	mg/kg	3.60E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.E-07	1.05E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
			Exp. Route Total								6.E-06					0.04

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Current/Future Seasonal Resident, Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
			Dermal	Arsenic	30.54	mg/kg	7.30E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.E-06	2.13E-06	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.007
				Barium	111.7	mg/kg	8.90E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.60E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.0001
				Cadmium	0.34	mg/kg	2.71E-10	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.90E-10	mg/kg-day	1.0E-03	1/(mg/kg-day)	0.0000008
				Chromium	18.02	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	1.5E+00	1/(mg/kg-day)	NA
				Lead	16.98	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Nickel	11.79	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	2.0E-02	1/(mg/kg-day)	NA
				Selenium	1.599	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Silver	0.113	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Vanadium	33.33	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Zinc	93.75	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	3.0E-01	1/(mg/kg-day)	NA
				Mercury	0.101	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	3.0E-04	1/(mg/kg-day)	NA
				PCB-1260	0.121	mg/kg	1.35E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.E-08	3.94E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzene	0.032	mg/kg	2.55E-09	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	1.E-10	7.44E-09	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.000002
				Ethylbenzene	0.517	mg/kg	4.12E-08	mg/kg-day	1.1E-02	$(mg/kg\text{-}day)^{-1}$	5.E-10	1.20E-07	mg/kg-day	1.0E-01	1/(mg/kg-day)	0.000001
				m,p-xylene	3.825	mg/kg	3.05E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	8.89E-07	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.000004
				o-xylene	1.708	mg/kg	1.36E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.97E-07	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.000002
				Total Xylenes	4.303	mg/kg	3.43E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.00E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.000005
				1-Methylnaphthalene	28.16	mg/kg	2.24E-06	mg/kg-day	2.9E-02	$(mg/kg\text{-}day)^{-1}$	7.E-08	6.55E-06	mg/kg-day	7.0E-02	1/(mg/kg-day)	0.00009
				2-Methylnaphthalene	33.54	mg/kg	2.67E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.80E-06	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.002
				Acenaphthene	1.54	mg/kg	1.60E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.65E-07	mg/kg-day	6.0E-02	1/(mg/kg-day)	0.000008
				Acenaphthylene	0.994	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Anthracene	0.656	mg/kg	6.80E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.98E-07	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.0000007
				Benzo[a]anthracene	0.0708	mg/kg	7.34E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.14E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[a]pyrene	0.0319	mg/kg	3.31E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	9.64E-09	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[b]fluoranthene	0.0704	mg/kg	7.29E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.13E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[g,h,i]perylene	0.0138	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[k]fluoranthene	0.0238	mg/kg	2.47E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.19E-09	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Chrysene	0.189	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Dibenz(a,h)anthracene	0.011	mg/kg	1.14E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.32E-09	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Fluoranthene	0.779	mg/kg	8.07E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.35E-07	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.000
				Fluorene	3.628	mg/kg	3.76E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.10E-06	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.00003
				Indeno[1,2,3-cd]pyrene	0.0163	mg/kg	1.69E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.93E-09	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Naphthalene	12.85	mg/kg	1.02E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.99E-06	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.0001
				Phenanthrene	1.896	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Pyrene	0.503	mg/kg	4.01E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.17E-07	mg/kg-day	3.0E-02	1/(mg/kg-day)	0.000004
				CPAH	0.298	mg/kg	3.09E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.E-07	9.01E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
			Exp. Route Total								1.E-06					0.009
		Exposure Point Total									7.E-06					0.05
	Exposure Medium Total										7.E-06					0.05

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Current/Future Seasonal Resident, Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Air	Inhalation of Fugitive Dust	Inhalation	Arsenic	3.7851E-08	mg/kg	2.12E-15	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	9.E-18	6.18E-18	mg/m^3	1.5E-05	mg/m^3	0.0000000000004
				Barium	1.3844E-07	mg/kg	7.75E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.26E-17	mg/m^3	5.0E-04	mg/m^3	0.00000000000005
				Cadmium	4.21392E-10	mg/kg	2.36E-17	ug/m3	1.8E-03	$(ug/m^3)^{-1}$	4.E-20	6.88E-20	mg/m^3	2.0E-05	mg/m^3	0.000000000000003
				Chromium	2.23338E-08	mg/kg	1.25E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.65E-18	mg/m^3	No toxicity value	mg/m^3	NA
				Lead	2.10448E-08	mg/kg	1.18E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.44E-18	mg/m^3	No toxicity value	mg/m^3	NA
				Nickel	1.46124E-08	mg/kg	8.18E-16	ug/m3	2.6E-04	$(ug/m^3)^{-1}$	2.E-19	2.39E-18	mg/m^3	9.0E-05	mg/m^3	0.00000000000003
				Selenium	1.98178E-09	mg/kg	1.11E-16	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.24E-19	mg/m^3	2.0E-02	mg/m^3	0.00000000000000002
				Silver	1.40051E-10	mg/kg	7.84E-18	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.29E-20	mg/m^3	No toxicity value	mg/m^3	NA
				Vanadium	4.13088E-08	mg/kg	2.31E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	6.75E-18	mg/m^3	No toxicity value	mg/m^3	NA
				Zinc	1.16193E-07	mg/kg	6.51E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.90E-17	mg/m^3	No toxicity value	mg/m^3	NA
				Mercury	1.25178E-10	mg/kg	7.01E-18	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.04E-20	mg/m^3	3.0E-04	mg/m^3	0.00000000000000007
				PCB-1260	1.49966E-10	mg/kg	8.40E-18	ug/m3	5.7E-04	$(ug/m^3)^{-1}$	5.E-21	2.45E-20	mg/m^3	No toxicity value	mg/m^3	NA
				Benzene	1.43854E-05	mg/kg	8.05E-13	ug/m3	7.8E-06	$(ug/m^3)^{-1}$	6.E-18	2.35E-15	mg/m^3	3.0E-02	mg/m^3	0.00000000000008
				Ethylbenzene	0.000155761	mg/kg	8.72E-12	ug/m3	2.5E-06	$(ug/m^3)^{-1}$	2.E-17	2.54E-14	mg/m^3	1.0E+00	mg/m^3	0.00000000000003
				m,p-xylene	4.74066E-09	mg/kg	2.65E-16	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.74E-19	mg/m^3	1.0E-01	mg/m^3	0.000000000000000008
				o-xylene	2.11688E-09	mg/kg	1.19E-16	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.46E-19	mg/m^3	1.0E-01	mg/m^3	0.000000000000000003
				Total Xylenes	5.33309E-09	mg/kg	2.99E-16	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.71E-19	mg/m^3	1.0E-01	mg/m^3	0.000000000000000009
				1-Methylnaphthalene	0.000546848	mg/kg	3.06E-11	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.93E-14	mg/m^3	No toxicity value	mg/m^3	NA
				2-Methylnaphthalene	0.000460071	mg/kg	2.58E-11	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.51E-14	mg/m^3	No toxicity value	mg/m^3	NA
				Acenaphthene	1.0586E-05	mg/kg	5.93E-13	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.73E-15	mg/m^3	No toxicity value	mg/m^3	NA
				Acenaphthylene	9.63553E-06	mg/kg	5.39E-13	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.57E-15	mg/m^3	No toxicity value	mg/m^3	NA
				Anthracene	1.17595E-06	mg/kg	6.58E-14	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.92E-16	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[a]anthracene	8.77488E-11	mg/kg	4.91E-18	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	5.E-22	1.43E-20	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[a]pyrene	3.95365E-11	mg/kg	2.21E-18	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	2.E-21	6.46E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[b]fluoranthene	8.7253E-11	mg/kg	4.89E-18	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	5.E-22	1.42E-20	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[g,h,i]perylene	1.71036E-11	mg/kg	9.58E-19	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.79E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[k]fluoranthene	2.94975E-11	mg/kg	1.65E-18	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	2.E-22	4.82E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Chrysene	8.69672E-08	mg/kg	4.87E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.42E-17	mg/m^3	No toxicity value	mg/m^3	NA
				Dibenz(a,h)anthracene	1.36333E-11	mg/kg	7.63E-19	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.23E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Fluoranthene	4.71113E-07	mg/kg	2.64E-14	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.69E-17	mg/m^3	No toxicity value	mg/m^3	NA
				Fluorene	1.17333E-05	mg/kg	6.57E-13	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.92E-15	mg/m^3	No toxicity value	mg/m^3	NA
				Indeno[1,2,3-cd]pyrene	2.0202E-11	mg/kg	1.13E-18	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	1.E-22	3.30E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Naphthalene	0.00037174	mg/kg	2.08E-11	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	7.E-16	6.07E-14	mg/m^3	3.0E-03	mg/m^3	0.000000000002
				Phenanthrene	0.00019419	mg/kg	1.09E-11	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.17E-14	mg/m^3	No toxicity value	mg/m^3	NA
				Pyrene	2.06147E-07	mg/kg	1.15E-14	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.37E-17	mg/m^3	No toxicity value	mg/m^3	NA
				CPAH	3.69338E-10	mg/kg	2.07E-17	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	2.E-20	6.03E-20	mg/m^3	No toxicity value	mg/m^3	NA
			Exp. Route Total								7.E-16					0.000000000002
		Exposure Point Total									7.E-16					0.000000000002
	Exposure Medium Total										7.E-16					0.000000000002
Medium Total											7.E-06					0.05
									Total of Receptor Risks Across All Media		7.E-06			Total of Receptor Hazards Across All Media		0.05

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Current/Future Seasonal Resident, Child

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Seasonal Resident
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	On-Site	Ingestion	Arsenic	30.54	mg/kg	8.61E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.E-05	1.00E-04	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.3
				Barium	111.7	mg/kg	3.15E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.67E-04	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.002
				Cadmium	0.34	mg/kg	9.58E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.12E-06	mg/kg-day	1.0E-03	1/(mg/kg-day)	0.001
				Chromium	18.02	mg/kg	5.08E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.92E-05	mg/kg-day	1.5E+00	1/(mg/kg-day)	0.00004
				Lead	16.98	mg/kg	4.78E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.58E-05	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Nickel	11.79	mg/kg	3.32E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.88E-05	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.002
				Selenium	1.599	mg/kg	4.51E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.26E-06	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.001
				Silver	0.113	mg/kg	3.18E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.72E-07	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.00007
				Vanadium	33.33	mg/kg	9.39E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.10E-04	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.02
				Zinc	93.75	mg/kg	2.64E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.08E-04	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.001
				Mercury	0.101	mg/kg	2.85E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.32E-07	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.001
				PCB-1260	0.121	mg/kg	3.41E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	7.E-08	3.98E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzene	0.032	mg/kg	9.02E-09	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	5.E-10	1.05E-07	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.00003
				Ethylbenzene	0.517	mg/kg	1.46E-07	mg/kg-day	1.1E-02	$(mg/kg\text{-}day)^{-1}$	2.E-09	1.70E-06	mg/kg-day	1.0E-01	1/(mg/kg-day)	0.00002
				m,p-xylene	3.825	mg/kg	1.08E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.26E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00006
				o-xylene	1.708	mg/kg	4.81E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.62E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00003
				Total Xylenes	4.303	mg/kg	1.21E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.41E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00007
				1-Methylnaphthalene	28.16	mg/kg	7.94E-06	mg/kg-day	2.9E-02	$(mg/kg\text{-}day)^{-1}$	2.E-07	9.26E-05	mg/kg-day	7.0E-02	1/(mg/kg-day)	0.001
				2-Methylnaphthalene	33.54	mg/kg	9.45E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.10E-04	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.03
				Acenaphthene	1.54	mg/kg	4.34E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.06E-06	mg/kg-day	6.0E-02	1/(mg/kg-day)	0.00008
				Acenaphthylene	0.994	mg/kg	2.80E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.27E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Anthracene	0.656	mg/kg	1.85E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.16E-06	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.000007
				Benzo[a]anthracene	0.0708	mg/kg	2.00E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.33E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[a]pyrene	0.0319	mg/kg	8.99E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.05E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[b]fluoranthene	0.0704	mg/kg	1.98E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.31E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[g,h,i]perylene	0.0138	mg/kg	3.89E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.54E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[k]fluoranthene	0.0238	mg/kg	6.71E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.82E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Chrysene	0.189	mg/kg	5.33E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.21E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Dibenz(a,h)anthracene	0.011	mg/kg	3.10E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.62E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Fluoranthene	0.779	mg/kg	2.20E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.56E-06	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.00006
				Fluorene	3.628	mg/kg	1.02E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.19E-05	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.0003
				Indeno[1,2,3-cd]pyrene	0.0163	mg/kg	4.59E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.36E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Naphthalene	12.85	mg/kg	3.62E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.22E-05	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.002
				Phenanthrene	1.896	mg/kg	5.34E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.23E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Pyrene	0.503	mg/kg	1.42E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.65E-06	mg/kg-day	3.0E-02	1/(mg/kg-day)	0.00006
				CPAH	0.298	mg/kg	8.40E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.E-07	9.80E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
			Exp. Route Total								1.E-05					0.4

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Current/Future Seasonal Resident, Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
			Dermal	Arsenic	30.54	mg/kg	7.23E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.E-06	8.43E-06	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.03
				Barium	111.7	mg/kg	8.81E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.03E-04	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.0005
				Cadmium	0.34	mg/kg	2.68E-10	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.13E-09	mg/kg-day	1.0E-03	1/(mg/kg-day)	0.000003
				Chromium	18.02	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	1.5E+00	1/(mg/kg-day)	NA
				Lead	16.98	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Nickel	11.79	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	2.0E-02	1/(mg/kg-day)	NA
				Selenium	1.599	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Silver	0.113	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Vanadium	33.33	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Zinc	93.75	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	3.0E-01	1/(mg/kg-day)	NA
				Mercury	0.101	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	3.0E-04	1/(mg/kg-day)	NA
				PCB-1260	0.121	mg/kg	1.34E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.E-08	1.56E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzene	0.032	mg/kg	2.52E-09	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	1.E-10	2.95E-08	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.000007
				Ethylbenzene	0.517	mg/kg	4.08E-08	mg/kg-day	1.1E-02	$(mg/kg\text{-}day)^{-1}$	4.E-10	4.76E-07	mg/kg-day	1.0E-01	1/(mg/kg-day)	0.000005
				m,p-xylene	3.825	mg/kg	3.02E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.52E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00002
				o-xylene	1.708	mg/kg	1.35E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.57E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.000008
				Total Xylenes	4.303	mg/kg	3.40E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.96E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00002
				1-Methylnaphthalene	28.16	mg/kg	2.22E-06	mg/kg-day	2.9E-02	$(mg/kg\text{-}day)^{-1}$	6.E-08	2.59E-05	mg/kg-day	7.0E-02	1/(mg/kg-day)	0.0004
				2-Methylnaphthalene	33.54	mg/kg	2.65E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.09E-05	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.008
				Acenaphthene	1.54	mg/kg	1.58E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.84E-06	mg/kg-day	6.0E-02	1/(mg/kg-day)	0.00003
				Acenaphthylene	0.994	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Anthracene	0.656	mg/kg	6.73E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.85E-07	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.000003
				Benzo[a]anthracene	0.0708	mg/kg	7.26E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	8.47E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[a]pyrene	0.0319	mg/kg	3.27E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.82E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[b]fluoranthene	0.0704	mg/kg	7.22E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	8.42E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[g,h,i]perylene	0.0138	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[k]fluoranthene	0.0238	mg/kg	2.44E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.85E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Chrysene	0.189	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Dibenz(a,h)anthracene	0.011	mg/kg	1.13E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.32E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Fluoranthene	0.779	mg/kg	7.99E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	9.32E-07	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.00002
				Fluorene	3.628	mg/kg	3.72E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.34E-06	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.0001
				Indeno[1,2,3-cd]pyrene	0.0163	mg/kg	1.67E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.95E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Naphthalene	12.85	mg/kg	1.01E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.18E-05	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.0006
				Phenanthrene	1.896	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Pyrene	0.503	mg/kg	3.97E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.63E-07	mg/kg-day	3.0E-02	1/(mg/kg-day)	0.00002
				CPAH	0.298	mg/kg	3.06E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.E-07	3.57E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
			Exp. Route Total								1.E-06					0.04
		Exposure Point Total									2.E-05					0.4
	Exposure Medium Total										2.E-05					0.4

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Current/Future Seasonal Resident, Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Air	Inhalation of Fugitive Dust	Inhalation	Arsenic	3.7851E-08	mg/kg	5.30E-16	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	2.E-18	6.18E-18	mg/m^3	1.5E-05	mg/m^3	0.0000000000004
				Barium	1.3844E-07	mg/kg	1.94E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.26E-17	mg/m^3	5.0E-04	mg/m^3	0.00000000000005
				Cadmium	4.21392E-10	mg/kg	5.90E-18	ug/m3	1.8E-03	$(ug/m^3)^{-1}$	1.E-20	6.88E-20	mg/m^3	2.0E-05	mg/m^3	0.000000000000003
				Chromium	2.23338E-08	mg/kg	3.13E-16	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.65E-18	mg/m^3	No toxicity value	mg/m^3	NA
				Lead	2.10448E-08	mg/kg	2.95E-16	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.44E-18	mg/m^3	No toxicity value	mg/m^3	NA
				Nickel	1.46124E-08	mg/kg	2.05E-16	ug/m3	2.6E-04	$(ug/m^3)^{-1}$	5.E-20	2.39E-18	mg/m^3	9.0E-05	mg/m^3	0.00000000000003
				Selenium	1.98178E-09	mg/kg	2.77E-17	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.24E-19	mg/m^3	2.0E-02	mg/m^3	0.00000000000000002
				Silver	1.40051E-10	mg/kg	1.96E-18	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.29E-20	mg/m^3	No toxicity value	mg/m^3	NA
				Vanadium	4.13088E-08	mg/kg	5.78E-16	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	6.75E-18	mg/m^3	No toxicity value	mg/m^3	NA
				Zinc	1.16193E-07	mg/kg	1.63E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.90E-17	mg/m^3	No toxicity value	mg/m^3	NA
				Mercury	1.25178E-10	mg/kg	1.75E-18	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.04E-20	mg/m^3	3.0E-04	mg/m^3	0.00000000000000007
				PCB-1260	1.49966E-10	mg/kg	2.10E-18	ug/m3	5.7E-04	$(ug/m^3)^{-1}$	1.E-21	2.45E-20	mg/m^3	No toxicity value	mg/m^3	NA
				Benzene	1.43854E-05	mg/kg	2.01E-13	ug/m3	7.8E-06	$(ug/m^3)^{-1}$	2.E-18	2.35E-15	mg/m^3	3.0E-02	mg/m^3	0.00000000000008
				Ethylbenzene	0.000155761	mg/kg	2.18E-12	ug/m3	2.5E-06	$(ug/m^3)^{-1}$	5.E-18	2.54E-14	mg/m^3	1.0E+00	mg/m^3	0.00000000000003
				m,p-xylene	4.74066E-09	mg/kg	6.64E-17	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.74E-19	mg/m^3	1.0E-01	mg/m^3	0.000000000000000008
				o-xylene	2.11688E-09	mg/kg	2.96E-17	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.46E-19	mg/m^3	1.0E-01	mg/m^3	0.000000000000000003
				Total Xylenes	5.33309E-09	mg/kg	7.46E-17	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.71E-19	mg/m^3	1.0E-01	mg/m^3	0.000000000000000009
				1-Methylnaphthalene	0.000546848	mg/kg	7.65E-12	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.93E-14	mg/m^3	No toxicity value	mg/m^3	NA
				2-Methylnaphthalene	0.000460071	mg/kg	6.44E-12	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.51E-14	mg/m^3	No toxicity value	mg/m^3	NA
				Acenaphthene	1.0586E-05	mg/kg	1.48E-13	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.73E-15	mg/m^3	No toxicity value	mg/m^3	NA
				Acenaphthylene	9.63553E-06	mg/kg	1.35E-13	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.57E-15	mg/m^3	No toxicity value	mg/m^3	NA
				Anthracene	1.17595E-06	mg/kg	1.65E-14	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.92E-16	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[a]anthracene	8.77488E-11	mg/kg	1.23E-18	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	1.E-22	1.43E-20	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[a]pyrene	3.95365E-11	mg/kg	5.53E-19	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	6.E-22	6.46E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[b]fluoranthene	8.7253E-11	mg/kg	1.22E-18	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	1.E-22	1.42E-20	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[g,h,i]perylene	1.71036E-11	mg/kg	2.39E-19	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.79E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[k]fluoranthene	2.94975E-11	mg/kg	4.13E-19	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	5.E-23	4.82E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Chrysene	8.69672E-08	mg/kg	1.22E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.42E-17	mg/m^3	No toxicity value	mg/m^3	NA
				Dibenz(a,h)anthracene	1.36333E-11	mg/kg	1.91E-19	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	2.23E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Fluoranthene	4.71113E-07	mg/kg	6.59E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.69E-17	mg/m^3	No toxicity value	mg/m^3	NA
				Fluorene	1.17333E-05	mg/kg	1.64E-13	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.92E-15	mg/m^3	No toxicity value	mg/m^3	NA
				Indeno[1,2,3-cd]pyrene	2.0202E-11	mg/kg	2.83E-19	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	3.E-23	3.30E-21	mg/m^3	No toxicity value	mg/m^3	NA
				Naphthalene	0.00037174	mg/kg	5.20E-12	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	2.E-16	6.07E-14	mg/m^3	3.0E-03	mg/m^3	0.000000000002
				Phenanthrene	0.00019419	mg/kg	2.72E-12	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.17E-14	mg/m^3	No toxicity value	mg/m^3	NA
				Pyrene	2.06147E-07	mg/kg	2.89E-15	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.37E-17	mg/m^3	No toxicity value	mg/m^3	NA
				CPAH	3.69338E-10	mg/kg	5.17E-18	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	6.E-21	6.03E-20	mg/m^3	No toxicity value	mg/m^3	NA
			Exp. Route Total								2.E-16					0.000000000002
		Exposure Point Total									2.E-16					0.000000000002
	Exposure Medium Total										2.E-16					0.000000000002
Medium Total											2.E-05					0.4
									Total of Receptor Risks Across All Media		2.E-05			Total of Receptor Hazards Across All Media		0.4

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Future Resident, Adult

Scenario Timeframe:	Future
Receptor Population:	On-Site Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	On-Site	Ingestion	Arsenic	30.54	mg/kg	1.11E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.E-05	3.23E-05	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.1
				Barium	111.7	mg/kg	4.05E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.18E-04	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.0006
				Cadmium	0.34	mg/kg	1.23E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.59E-07	mg/kg-day	1.0E-03	1/(mg/kg-day)	0.0004
				Chromium	18.02	mg/kg	6.53E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.90E-05	mg/kg-day	1.5E+00	1/(mg/kg-day)	0.00001
				Lead	16.98	mg/kg	6.15E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.79E-05	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Nickel	11.79	mg/kg	4.27E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.25E-05	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.0006
				Selenium	1.599	mg/kg	5.79E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.69E-06	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.0003
				Silver	0.113	mg/kg	4.09E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.19E-07	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.00002
				Vanadium	33.33	mg/kg	1.21E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.52E-05	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.007
				Zinc	93.75	mg/kg	3.40E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	9.91E-05	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.0003
				Mercury	0.101	mg/kg	3.66E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.07E-07	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.0004
				PCB-1260	0.121	mg/kg	4.38E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.E-08	1.28E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzene	0.032	mg/kg	1.16E-08	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	6.E-10	3.38E-08	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.000008
				Ethylbenzene	0.517	mg/kg	1.87E-07	mg/kg-day	1.1E-02	$(mg/kg\text{-}day)^{-1}$	2.E-09	5.46E-07	mg/kg-day	1.0E-01	1/(mg/kg-day)	0.000005
				m,p-xylene	3.825	mg/kg	1.39E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.04E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00002
				o-xylene	1.708	mg/kg	6.19E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.80E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.000009
				Total Xylenes	4.303	mg/kg	1.56E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.55E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00002
				1-Methylnaphthalene	28.16	mg/kg	1.02E-05	mg/kg-day	2.9E-02	$(mg/kg\text{-}day)^{-1}$	3.E-07	2.98E-05	mg/kg-day	7.0E-02	1/(mg/kg-day)	0.0004
				2-Methylnaphthalene	33.54	mg/kg	1.22E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.54E-05	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.009
				Acenaphthene	1.54	mg/kg	5.58E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.63E-06	mg/kg-day	6.0E-02	1/(mg/kg-day)	0.00003
				Acenaphthylene	0.994	mg/kg	3.60E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.05E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Anthracene	0.656	mg/kg	2.38E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.93E-07	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.000002
				Benzo[a]anthracene	0.0708	mg/kg	2.57E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.48E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[a]pyrene	0.0319	mg/kg	1.16E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.37E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[b]fluoranthene	0.0704	mg/kg	2.55E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.44E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[g,h,i]perylene	0.0138	mg/kg	5.00E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.46E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[k]fluoranthene	0.0238	mg/kg	8.62E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.52E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Chrysene	0.189	mg/kg	6.85E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.00E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Dibenz(a,h)anthracene	0.011	mg/kg	3.99E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.16E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Fluoranthene	0.779	mg/kg	2.82E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	8.23E-07	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.00002
				Fluorene	3.628	mg/kg	1.31E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.83E-06	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.0001
				Indeno[1,2,3-cd]pyrene	0.0163	mg/kg	5.91E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.72E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Naphthalene	12.85	mg/kg	4.66E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.36E-05	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.0007
				Phenanthrene	1.896	mg/kg	6.87E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.00E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Pyrene	0.503	mg/kg	1.82E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.32E-07	mg/kg-day	3.0E-02	1/(mg/kg-day)	0.00002
				CPAH	0.298	mg/kg	1.08E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.E-07	3.15E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
			Exp. Route Total								2.E-05					0.1

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Future Resident, Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
			Dermal	Arsenic	30.54	mg/kg	2.19E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.E-06	6.39E-06	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.02
				Barium	111.7	mg/kg	2.67E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.79E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.0004
				Cadmium	0.34	mg/kg	8.13E-10	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.37E-09	mg/kg-day	1.0E-03	1/(mg/kg-day)	0.000002
				Chromium	18.02	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	1.5E+00	1/(mg/kg-day)	NA
				Lead	16.98	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Nickel	11.79	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	2.0E-02	1/(mg/kg-day)	NA
				Selenium	1.599	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Silver	0.113	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Vanadium	33.33	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Zinc	93.75	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	3.0E-01	1/(mg/kg-day)	NA
				Mercury	0.101	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	3.0E-04	1/(mg/kg-day)	NA
				PCB-1260	0.121	mg/kg	4.05E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.E-08	1.18E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzene	0.032	mg/kg	7.65E-09	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	4.E-10	2.23E-08	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.000006
				Ethylbenzene	0.517	mg/kg	1.24E-07	mg/kg-day	1.1E-02	$(mg/kg\text{-}day)^{-1}$	1.E-09	3.61E-07	mg/kg-day	1.0E-01	1/(mg/kg-day)	0.000004
				m,p-xylene	3.825	mg/kg	9.15E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.67E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00001
				o-xylene	1.708	mg/kg	4.08E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.19E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.000006
				Total Xylenes	4.303	mg/kg	1.03E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.00E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00002
				1-Methylnaphthalene	28.16	mg/kg	6.73E-06	mg/kg-day	2.9E-02	$(mg/kg\text{-}day)^{-1}$	2.E-07	1.96E-05	mg/kg-day	7.0E-02	1/(mg/kg-day)	0.0003
				2-Methylnaphthalene	33.54	mg/kg	8.02E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.34E-05	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.006
				Acenaphthene	1.54	mg/kg	4.79E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.40E-06	mg/kg-day	6.0E-02	1/(mg/kg-day)	0.00002
				Acenaphthylene	0.994	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Anthracene	0.656	mg/kg	2.04E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.95E-07	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.000002
				Benzo[a]anthracene	0.0708	mg/kg	2.20E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.42E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[a]pyrene	0.0319	mg/kg	9.92E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.89E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[b]fluoranthene	0.0704	mg/kg	2.19E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.38E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[g,h,i]perylene	0.0138	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[k]fluoranthene	0.0238	mg/kg	7.40E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.16E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Chrysene	0.189	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Dibenz(a,h)anthracene	0.011	mg/kg	3.42E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	9.97E-09	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Fluoranthene	0.779	mg/kg	2.42E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.06E-07	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.00002
				Fluorene	3.628	mg/kg	1.13E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.29E-06	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.00008
				Indeno[1,2,3-cd]pyrene	0.0163	mg/kg	5.07E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.48E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Naphthalene	12.85	mg/kg	3.07E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	8.96E-06	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.0004
				Phenanthrene	1.896	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Pyrene	0.503	mg/kg	1.20E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.51E-07	mg/kg-day	3.0E-02	1/(mg/kg-day)	0.00001
				CPAH	0.298	mg/kg	9.26E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.E-07	2.70E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
			Exp. Route Total								4.E-06					0.03
		Exposure Point Total									2.E-05					0.2
	Exposure Medium Total										2.E-05					0.2

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Future Resident, Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Air	Inhalation of Fugitive Dust and Volatiles	Inhalation	Arsenic	3.7851E-08	mg/kg	9.60E-06	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	4.E-08	2.80E-08	mg/m^3	1.5E-05	mg/m^3	0.002
				Barium	1.3844E-07	mg/kg	3.51E-05	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.02E-07	mg/m^3	5.0E-04	mg/m^3	0.0002
				Cadmium	4.21392E-10	mg/kg	1.07E-07	ug/m3	1.8E-03	$(ug/m^3)^{-1}$	2.E-10	3.12E-10	mg/m^3	2.0E-05	mg/m^3	0.00002
				Chromium	2.23338E-08	mg/kg	5.66E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.65E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Lead	2.10448E-08	mg/kg	5.34E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.56E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Nickel	1.46124E-08	mg/kg	3.71E-06	ug/m3	2.6E-04	$(ug/m^3)^{-1}$	1.E-09	1.08E-08	mg/m^3	9.0E-05	mg/m^3	0.0001
				Selenium	1.98178E-09	mg/kg	5.03E-07	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.47E-09	mg/m^3	2.0E-02	mg/m^3	0.00000007
				Silver	1.40051E-10	mg/kg	3.55E-08	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.04E-10	mg/m^3	No toxicity value	mg/m^3	NA
				Vanadium	4.13088E-08	mg/kg	1.05E-05	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.06E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Zinc	1.16193E-07	mg/kg	2.95E-05	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.60E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Mercury	1.25178E-10	mg/kg	3.17E-08	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	9.26E-11	mg/m^3	3.0E-04	mg/m^3	0.0000003
				PCB-1260	1.49966E-10	mg/kg	3.80E-08	ug/m3	5.7E-04	$(ug/m^3)^{-1}$	2.E-11	1.11E-10	mg/m^3	No toxicity value	mg/m^3	NA
				Benzene	1.43854E-05	mg/kg	3.65E-03	ug/m3	7.8E-06	$(ug/m^3)^{-1}$	3.E-08	1.06E-05	mg/m^3	3.0E-02	mg/m^3	0.0004
				Ethylbenzene	0.000155761	mg/kg	3.95E-02	ug/m3	2.5E-06	$(ug/m^3)^{-1}$	1.E-07	1.15E-04	mg/m^3	1.0E+00	mg/m^3	0.0001
				m,p-xylene	4.74066E-09	mg/kg	1.20E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.51E-09	mg/m^3	1.0E-01	mg/m^3	0.00000004
				o-xylene	2.11688E-09	mg/kg	5.37E-07	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.57E-09	mg/m^3	1.0E-01	mg/m^3	0.00000002
				Total Xylenes	5.33309E-09	mg/kg	1.35E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.95E-09	mg/m^3	1.0E-01	mg/m^3	0.00000004
				1-Methylnaphthalene	0.000546848	mg/kg	1.39E-01	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	4.05E-04	mg/m^3	No toxicity value	mg/m^3	NA
				2-Methylnaphthalene	0.000460071	mg/kg	1.17E-01	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.40E-04	mg/m^3	No toxicity value	mg/m^3	NA
				Acenaphthene	1.0586E-05	mg/kg	2.68E-03	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.83E-06	mg/m^3	No toxicity value	mg/m^3	NA
				Acenaphthylene	9.63553E-06	mg/kg	2.44E-03	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.13E-06	mg/m^3	No toxicity value	mg/m^3	NA
				Anthracene	1.17595E-06	mg/kg	2.98E-04	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.70E-07	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[a]anthracene	8.77488E-11	mg/kg	2.23E-08	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	2.E-12	6.49E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[a]pyrene	3.95365E-11	mg/kg	1.00E-08	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	1.E-11	2.92E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[b]fluoranthene	8.7253E-11	mg/kg	2.21E-08	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	2.E-12	6.45E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[g,h,i]perylene	1.71036E-11	mg/kg	4.34E-09	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.27E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[k]fluoranthene	2.94975E-11	mg/kg	7.48E-09	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	8.E-13	2.18E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Chrysene	8.69672E-08	mg/kg	2.21E-05	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	6.43E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Dibenz(a,h)anthracene	1.36333E-11	mg/kg	3.46E-09	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.01E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Fluoranthene	4.71113E-07	mg/kg	1.19E-04	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.48E-07	mg/m^3	No toxicity value	mg/m^3	NA
				Fluorene	1.17333E-05	mg/kg	2.98E-03	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.68E-06	mg/m^3	No toxicity value	mg/m^3	NA
				Indeno[1,2,3-cd]pyrene	2.0202E-11	mg/kg	5.12E-09	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	6.E-13	1.49E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Naphthalene	0.00037174	mg/kg	9.43E-02	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	3.E-06	2.75E-04	mg/m^3	3.0E-03	mg/m^3	0.09
				Phenanthrene	0.00019419	mg/kg	4.93E-02	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.44E-04	mg/m^3	No toxicity value	mg/m^3	NA
				Pyrene	2.06147E-07	mg/kg	5.23E-05	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.52E-07	mg/m^3	No toxicity value	mg/m^3	NA
				CPAH	3.69338E-10	mg/kg	9.37E-08	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	1.E-10	2.73E-10	mg/m^3	No toxicity value	mg/m^3	NA
			Exp. Route Total								3.E-06					0.09
		Exposure Point Total									3.E-06					0.09
	Exposure Medium Total										3.E-06					0.09
Medium Total											3.E-05					0.3
											Total of Receptor Risks Across All Media					0.3

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Future Resident, Child

Scenario Timeframe:	Future
Receptor Population:	On-Site Resident
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	On-Site	Ingestion	Arsenic	30.54	mg/kg	2.58E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.E-05	3.01E-04	mg/kg-day	3.0E-04	1/(mg/kg-day)	1
				Barium	111.7	mg/kg	9.44E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.10E-03	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.006
				Cadmium	0.34	mg/kg	2.87E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.35E-06	mg/kg-day	1.0E-03	1/(mg/kg-day)	0.003
				Chromium	18.02	mg/kg	1.52E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.78E-04	mg/kg-day	1.5E+00	1/(mg/kg-day)	0.0001
				Lead	16.98	mg/kg	1.44E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.67E-04	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Nickel	11.79	mg/kg	9.97E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.16E-04	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.006
				Selenium	1.599	mg/kg	1.35E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.58E-05	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.003
				Silver	0.113	mg/kg	9.55E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.11E-06	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.0002
				Vanadium	33.33	mg/kg	2.82E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.29E-04	mg/kg-day	5.0E-03	1/(mg/kg-day)	0.07
				Zinc	93.75	mg/kg	7.93E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	9.25E-04	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.003
				Mercury	0.101	mg/kg	8.54E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	9.96E-07	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.003
				PCB-1260	0.121	mg/kg	1.02E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.E-07	1.19E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzene	0.032	mg/kg	2.71E-08	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	1.E-09	3.16E-07	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.00008
				Ethylbenzene	0.517	mg/kg	4.37E-07	mg/kg-day	1.1E-02	$(mg/kg\text{-}day)^{-1}$	5.E-09	5.10E-06	mg/kg-day	1.0E-01	1/(mg/kg-day)	0.00005
				m,p-xylene	3.825	mg/kg	3.23E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.77E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.0002
				o-xylene	1.708	mg/kg	1.44E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.68E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00008
				Total Xylenes	4.303	mg/kg	3.64E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.24E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.0002
				1-Methylnaphthalene	28.16	mg/kg	2.38E-05	mg/kg-day	2.9E-02	$(mg/kg\text{-}day)^{-1}$	7.E-07	2.78E-04	mg/kg-day	7.0E-02	1/(mg/kg-day)	0.004
				2-Methylnaphthalene	33.54	mg/kg	2.84E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.31E-04	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.08
				Acenaphthene	1.54	mg/kg	1.30E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.52E-05	mg/kg-day	6.0E-02	1/(mg/kg-day)	0.0003
				Acenaphthylene	0.994	mg/kg	8.40E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	9.80E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Anthracene	0.656	mg/kg	5.55E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.47E-06	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.00002
				Benzo[a]anthracene	0.0708	mg/kg	5.99E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.98E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[a]pyrene	0.0319	mg/kg	2.70E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.15E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[b]fluoranthene	0.0704	mg/kg	5.95E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	6.94E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[g,h,i]perylene	0.0138	mg/kg	1.17E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.36E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[k]fluoranthene	0.0238	mg/kg	2.01E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.35E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Chrysene	0.189	mg/kg	1.60E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.86E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Dibenz(a,h)anthracene	0.011	mg/kg	9.30E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.08E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Fluoranthene	0.779	mg/kg	6.59E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	7.68E-06	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.0002
				Fluorene	3.628	mg/kg	3.07E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.58E-05	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.0009
				Indeno[1,2,3-cd]pyrene	0.0163	mg/kg	1.38E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.61E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Naphthalene	12.85	mg/kg	1.09E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.27E-04	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.006
				Phenanthrene	1.896	mg/kg	1.60E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.87E-05	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Pyrene	0.503	mg/kg	4.25E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.96E-06	mg/kg-day	3.0E-02	1/(mg/kg-day)	0.0002
				CPAH	0.298	mg/kg	2.52E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.E-06	2.94E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
			Exp. Route Total								4.E-05					1

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Future Resident, Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
			Dermal	Arsenic	30.54	mg/kg	2.17E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.E-06	2.53E-05	mg/kg-day	3.0E-04	1/(mg/kg-day)	0.08
				Barium	111.7	mg/kg	2.64E-05	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.08E-04	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.002
				Cadmium	0.34	mg/kg	8.05E-10	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	9.39E-09	mg/kg-day	1.0E-03	1/(mg/kg-day)	0.000009
				Chromium	18.02	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	1.5E+00	1/(mg/kg-day)	NA
				Lead	16.98	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Nickel	11.79	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	2.0E-02	1/(mg/kg-day)	NA
				Selenium	1.599	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Silver	0.113	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Vanadium	33.33	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	5.0E-03	1/(mg/kg-day)	NA
				Zinc	93.75	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	3.0E-01	1/(mg/kg-day)	NA
				Mercury	0.101	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	3.0E-04	1/(mg/kg-day)	NA
				PCB-1260	0.121	mg/kg	4.01E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.E-08	4.68E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzene	0.032	mg/kg	7.57E-09	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	4.E-10	8.84E-08	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.00002
				Ethylbenzene	0.517	mg/kg	1.22E-07	mg/kg-day	1.1E-02	$(mg/kg\text{-}day)^{-1}$	1.E-09	1.43E-06	mg/kg-day	1.0E-01	1/(mg/kg-day)	0.00001
				m,p-xylene	3.825	mg/kg	9.05E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.06E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00005
				o-xylene	1.708	mg/kg	4.04E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	4.72E-06	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00002
				Total Xylenes	4.303	mg/kg	1.02E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.19E-05	mg/kg-day	2.0E-01	1/(mg/kg-day)	0.00006
				1-Methylnaphthalene	28.16	mg/kg	6.67E-06	mg/kg-day	2.9E-02	$(mg/kg\text{-}day)^{-1}$	2.E-07	7.78E-05	mg/kg-day	7.0E-02	1/(mg/kg-day)	0.001
				2-Methylnaphthalene	33.54	mg/kg	7.94E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	9.26E-05	mg/kg-day	4.0E-03	1/(mg/kg-day)	0.02
				Acenaphthene	1.54	mg/kg	4.74E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.53E-06	mg/kg-day	6.0E-02	1/(mg/kg-day)	0.00009
				Acenaphthylene	0.994	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Anthracene	0.656	mg/kg	2.02E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.36E-06	mg/kg-day	3.0E-01	1/(mg/kg-day)	0.000008
				Benzo[a]anthracene	0.0708	mg/kg	2.18E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.54E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[a]pyrene	0.0319	mg/kg	9.82E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.15E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[b]fluoranthene	0.0704	mg/kg	2.17E-08	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.53E-07	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[g,h,i]perylene	0.0138	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Benzo[k]fluoranthene	0.0238	mg/kg	7.32E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	8.54E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Chrysene	0.189	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Dibenz(a,h)anthracene	0.011	mg/kg	3.38E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.95E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Fluoranthene	0.779	mg/kg	2.40E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	2.80E-06	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.00007
				Fluorene	3.628	mg/kg	1.12E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.30E-05	mg/kg-day	4.0E-02	1/(mg/kg-day)	0.0003
				Indeno[1,2,3-cd]pyrene	0.0163	mg/kg	5.02E-09	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	5.85E-08	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Naphthalene	12.85	mg/kg	3.04E-06	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	3.55E-05	mg/kg-day	2.0E-02	1/(mg/kg-day)	0.002
				Phenanthrene	1.896	mg/kg	ND	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	ND	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
				Pyrene	0.503	mg/kg	1.19E-07	mg/kg-day	No toxicity value	$(mg/kg\text{-}day)^{-1}$	NA	1.39E-06	mg/kg-day	3.0E-02	1/(mg/kg-day)	0.00005
				CPAH	0.298	mg/kg	9.17E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.E-07	1.07E-06	mg/kg-day	No toxicity value	1/(mg/kg-day)	NA
			Exp. Route Total								4.E-06					0.1
		Exposure Point Total									5.E-05					1
	Exposure Medium Total										5.E-05					1

Northeast Cape Reevaluation of Human Health Risk, Site 28 Drainage Basin
Calculations of Reasonable Maximum Exposure, Future Resident, Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	ke/Exposure Concentra		CSF/Unit Risk		Cancer Risk	ke/Exposure Concentra		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Air	Inhalation of Fugitive Dust and volatiles	Inhalation	Arsenic	3.7851E-08	mg/kg	2.40E-06	ug/m3	4.3E-03	$(ug/m^3)^{-1}$	1.E-08	2.80E-08	mg/m^3	1.5E-05	mg/m^3	0.002
				Barium	1.3844E-07	mg/kg	8.78E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.02E-07	mg/m^3	5.0E-04	mg/m^3	0.0002
				Cadmium	4.21392E-10	mg/kg	2.67E-08	ug/m3	1.8E-03	$(ug/m^3)^{-1}$	5.E-11	3.12E-10	mg/m^3	2.0E-05	mg/m^3	0.00002
				Chromium	2.23338E-08	mg/kg	1.42E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.65E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Lead	2.10448E-08	mg/kg	1.33E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.56E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Nickel	1.46124E-08	mg/kg	9.27E-07	ug/m3	2.6E-04	$(ug/m^3)^{-1}$	2.E-10	1.08E-08	mg/m^3	9.0E-05	mg/m^3	0.0001
				Selenium	1.98178E-09	mg/kg	1.26E-07	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.47E-09	mg/m^3	2.0E-02	mg/m^3	0.00000007
				Silver	1.40051E-10	mg/kg	8.88E-09	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.04E-10	mg/m^3	No toxicity value	mg/m^3	NA
				Vanadium	4.13088E-08	mg/kg	2.62E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.06E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Zinc	1.16193E-07	mg/kg	7.37E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.60E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Mercury	1.25178E-10	mg/kg	7.94E-09	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	9.26E-11	mg/m^3	3.0E-04	mg/m^3	0.0000003
				PCB-1260	1.49966E-10	mg/kg	9.51E-09	ug/m3	5.7E-04	$(ug/m^3)^{-1}$	5.E-12	1.11E-10	mg/m^3	No toxicity value	mg/m^3	NA
				Benzene	1.43854E-05	mg/kg	9.12E-04	ug/m3	7.8E-06	$(ug/m^3)^{-1}$	7.E-09	1.06E-05	mg/m^3	3.0E-02	mg/m^3	0.0004
				Ethylbenzene	0.000155761	mg/kg	9.88E-03	ug/m3	2.5E-06	$(ug/m^3)^{-1}$	2.E-08	1.15E-04	mg/m^3	1.0E+00	mg/m^3	0.0001
				m,p-xylene	4.74066E-09	mg/kg	3.01E-07	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.51E-09	mg/m^3	1.0E-01	mg/m^3	0.00000004
				o-xylene	2.11688E-09	mg/kg	1.34E-07	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.57E-09	mg/m^3	1.0E-01	mg/m^3	0.00000002
				Total Xylenes	5.33309E-09	mg/kg	3.38E-07	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.95E-09	mg/m^3	1.0E-01	mg/m^3	0.00000004
				1-Methylnaphthalene	0.000546848	mg/kg	3.47E-02	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	4.05E-04	mg/m^3	No toxicity value	mg/m^3	NA
				2-Methylnaphthalene	0.000460071	mg/kg	2.92E-02	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.40E-04	mg/m^3	No toxicity value	mg/m^3	NA
				Acenaphthene	1.0586E-05	mg/kg	6.71E-04	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.83E-06	mg/m^3	No toxicity value	mg/m^3	NA
				Acenaphthylene	9.63553E-06	mg/kg	6.11E-04	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	7.13E-06	mg/m^3	No toxicity value	mg/m^3	NA
				Anthracene	1.17595E-06	mg/kg	7.46E-05	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.70E-07	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[a]anthracene	8.77488E-11	mg/kg	5.56E-09	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	6.E-13	6.49E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[a]pyrene	3.95365E-11	mg/kg	2.51E-09	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	3.E-12	2.92E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[b]fluoranthene	8.7253E-11	mg/kg	5.53E-09	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	6.E-13	6.45E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[g,h,i]perylene	1.71036E-11	mg/kg	1.08E-09	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.27E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Benzo[k]fluoranthene	2.94975E-11	mg/kg	1.87E-09	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	2.E-13	2.18E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Chrysene	8.69672E-08	mg/kg	5.51E-06	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	6.43E-08	mg/m^3	No toxicity value	mg/m^3	NA
				Dibenz(a,h)anthracene	1.36333E-11	mg/kg	8.64E-10	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.01E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Fluoranthene	4.71113E-07	mg/kg	2.99E-05	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	3.48E-07	mg/m^3	No toxicity value	mg/m^3	NA
				Fluorene	1.17333E-05	mg/kg	7.44E-04	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	8.68E-06	mg/m^3	No toxicity value	mg/m^3	NA
				Indeno[1,2,3-cd]pyrene	2.0202E-11	mg/kg	1.28E-09	ug/m3	1.1E-04	$(ug/m^3)^{-1}$	1.E-13	1.49E-11	mg/m^3	No toxicity value	mg/m^3	NA
				Naphthalene	0.00037174	mg/kg	2.36E-02	ug/m3	3.4E-05	$(ug/m^3)^{-1}$	8.E-07	2.75E-04	mg/m^3	3.0E-03	mg/m^3	0.09
				Phenanthrene	0.00019419	mg/kg	1.23E-02	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.44E-04	mg/m^3	No toxicity value	mg/m^3	NA
				Pyrene	2.06147E-07	mg/kg	1.31E-05	ug/m3	No toxicity value	$(ug/m^3)^{-1}$	NA	1.52E-07	mg/m^3	No toxicity value	mg/m^3	NA
				CPAH	3.69338E-10	mg/kg	2.34E-08	ug/m3	1.1E-03	$(ug/m^3)^{-1}$	3.E-11	2.73E-10	mg/m^3	No toxicity value	mg/m^3	NA
			Exp. Route Total								8.E-07					0.09
		Exposure Point Total									8.E-07					0.09
	Exposure Medium Total										8.E-07					0.09
Medium Total											5.E-05					1
									Total of Receptor Risks Across All Media		5.E-05	Total of Receptor Hazards Across All Media				1

APPENDIX C
Calculation of Cleanup Levels

Northeast Cape Reevaluation of Human Health Risk, Site 21 Wastewater Treatment Plant
Cleanup Levels

Cleanup Levels for permanent Adult residential exposures to soil at Site 21				
Analyte	RGO HI = 0.1	RGO 10-6	RGO HI = 1.0	RGO 10-5
Arsenic	2.3E+01	1.5E+00	2.3E+02	1.5E+01

Cleanup Levels for permanent Child residential exposures to soil at Site 21				
Analyte	RGO HI = 0.1	RGO 10-6	RGO HI = 1.0	RGO 10-5
Arsenic	2.79E+00	7.27E-01	2.79E+01	7.27E+00

Cleanup Levels for seasonal Adult residential exposures to soil at Site 21				
Analyte	RGO HI = 0.1	RGO 10-6	RGO HI = 1.0	RGO 10-5
Arsenic	7.05E+01	4.61E+00	7.05E+02	4.61E+01

Cleanup Levels for Child residential exposures to subsurface soil at Site 21				
Analyte	RGO HI = 0.1	RGO 10-6	RGO HI = 1.0	RGO 10-5
Arsenic	8.38E+00	2.18E+00	8.38E+01	2.18E+01

Northeast Cape Re-evaluation of Human Health Risk, Site 28 Drainage Basin
Cleanup Levels

Risk Assessments Results for permanent Adult residential exposures to soil at Site 28

Analyte	Exposure Point Concentration	Units	Ingestion Hazard Quotient	Ingestion Excess Cancer Risk	Dermal Contact Hazard Quotient	Dermal Contact Excess Cancer Risk	Inhalation Hazard Quotient	Inhalation Excess Cancer Risk	Total Scenario Hazard Index	Total Scenario Risk	RGO HI = 0.1	RGO 10^{-6}	RGO HI = 1.0	RGO 10^{-5}	RGO HI = 3.0	RGO 10^{-4}
Arsenic	3.1E+01	mg/kg	1.1E-01	1.7E-05	2.2E-02	3.3E-06	1.9E-03	4.1E-08	**1.3E-01**	**2.E-05**	1.2E+01	1.2E+00	1.2E+02	1.2E+01	3.6E+02	1.2E+02
Barium	1.1E+02	mg/kg	5.9E-04		3.9E-04		2.0E-04		1.2E-03		4.4E+01	4.4E+00	4.4E+02	4.4E+01	1.3E+03	4.4E+02
Cadmium	3.4E-01	mg/kg	3.6E-04		4.7E-06		1.6E-05	1.9E-10	3.8E-04	2.E-10	1.4E-01	1.3E-02	1.4E+00	1.3E-01	4.1E+00	1.3E+00
Chromium	1.8E+01	mg/kg	1.3E-05						1.3E-05		7.2E+00	7.1E-01	7.2E+01	7.1E+00	2.2E+02	7.1E+01
Lead	1.7E+01	mg/kg									6.8E+00	6.7E-01	6.8E+01	6.7E+00	2.0E+02	6.7E+01
Nickel	1.2E+01	mg/kg	6.2E-04				1.2E-04	9.6E-10	7.4E-04	1.E-09	4.7E+00	4.6E-01	4.7E+01	4.6E+00	1.4E+02	4.6E+01
Selenium	1.6E+00	mg/kg	3.4E-04				7.3E-08		3.4E-04		6.4E-01	6.3E-02	6.4E+00	6.3E-01	1.9E+01	6.3E+00
Silver	1.1E-01	mg/kg	2.4E-05						2.4E-05		4.5E-02	4.5E-03	4.5E-01	4.5E-02	1.3E+00	4.5E-01
Vanadium	3.3E+01	mg/kg	7.0E-03						7.0E-03		1.3E+01	1.3E+00	1.3E+02	1.3E+01	4.0E+02	1.3E+02
Zinc	9.4E+01	mg/kg	3.3E-04						3.3E-04		3.7E+01	3.7E+00	3.7E+02	3.7E+01	1.1E+03	3.7E+02
Mercury	1.0E-01	mg/kg	3.6E-04				3.1E-07		3.6E-04		4.0E-02	4.0E-03	4.0E-01	4.0E-02	1.2E+00	4.0E-01
PCB-1260	1.2E-01	mg/kg		8.8E-08		8.1E-08		2.2E-11		2.E-07	4.8E-02	4.8E-03	4.8E-01	4.8E-02	1.4E+00	4.8E-01
Benzene	3.2E-02	mg/kg	8.5E-06	6.4E-10	5.6E-06	4.2E-10	3.5E-04	2.8E-08	3.7E-04	3.E-08	1.3E-02	1.3E-03	1.3E-01	1.3E-02	3.8E-01	1.3E-01
Ethylbenzene	5.2E-01	mg/kg	5.5E-06	2.1E-09	3.6E-06	1.4E-09	1.2E-04	9.9E-08	1.2E-04	1.E-07	2.1E-01	2.0E-02	2.1E+00	2.0E-01	6.2E+00	2.0E+00
m,p-xylene	3.8E+00	mg/kg	2.0E-05		1.3E-05		3.5E-08		3.4E-05		1.5E+00	1.5E-01	1.5E+01	1.5E+00	4.6E+01	1.5E+01
o-xylene	1.7E+00	mg/kg	9.0E-06		6.0E-06		1.6E-08		1.5E-05		6.8E-01	6.7E-02	6.8E+00	6.7E-01	2.0E+01	6.7E+00
Total Xylenes	4.3E+00	mg/kg	2.3E-05		1.5E-05		3.9E-08		3.8E-05		1.7E+00	1.7E-01	1.7E+01	1.7E+00	5.1E+01	1.7E+01
1-Methylnaphthalene	2.8E+01	mg/kg	4.3E-04	3.0E-07	2.8E-04	2.0E-07			7.1E-04	5.E-07	1.1E+01	1.1E+00	1.1E+02	1.1E+01	3.4E+02	1.1E+02
2-Methylnaphthalene	3.4E+01	mg/kg	8.9E-03		5.8E-03				1.5E-02		1.3E+01	1.3E+00	1.3E+02	1.3E+01	4.0E+02	1.3E+02
Acenaphthene	1.5E+00	mg/kg	2.7E-05		2.3E-05				5.0E-05		6.1E-01	6.1E-02	6.1E+00	6.1E-01	1.8E+01	6.1E+00
Acenaphthylene	9.9E-01	mg/kg									4.0E-01	3.9E-02	4.0E+00	3.9E-01	1.2E+01	3.9E+00
Anthracene	6.6E-01	mg/kg	2.3E-06		2.0E-06				4.3E-06		2.6E-01	2.6E-02	2.6E+00	2.6E-01	7.8E+00	2.6E+00
Benzo[a]anthracene	7.1E-02	mg/kg						2.4E-12		2.E-12	2.8E-02	2.8E-03	2.8E-01	2.8E-02	8.4E-01	2.8E-01
Benzo[a]pyrene	3.2E-02	mg/kg						1.1E-11		1.E-11	1.3E-02	1.3E-03	1.3E-01	1.3E-02	3.8E-01	1.3E-01
Benzo[b]fluoranthene	7.0E-02	mg/kg						2.4E-12		2.E-12	2.8E-02	2.8E-03	2.8E-01	2.8E-02	8.4E-01	2.8E-01
Benzo[g,h,i]perylene	1.4E-02	mg/kg									5.5E-03	5.4E-04	5.5E-02	5.4E-03	1.6E-01	5.4E-02
Benzo[k]fluoranthene	2.4E-02	mg/kg						8.2E-13		8.E-13	9.5E-03	9.4E-04	9.5E-02	9.4E-03	2.8E-01	9.4E-02
Chrysene	1.9E-01	mg/kg									7.5E-02	7.4E-03	7.5E-01	7.4E-02	2.3E+00	7.4E-01
Dibenz(a,h)anthracene	1.1E-02	mg/kg									4.4E-03	4.3E-04	4.4E-02	4.3E-03	1.3E-01	4.3E-02
Fluoranthene	7.8E-01	mg/kg	2.1E-05		1.8E-05				3.8E-05		3.1E-01	3.1E-02	3.1E+00	3.1E-01	9.3E+00	3.1E+00
Fluorene	3.6E+00	mg/kg	9.6E-05		8.2E-05				1.8E-04		1.4E+00	1.4E-01	1.4E+01	1.4E+00	4.3E+01	1.4E+01
Indeno[1,2,3-cd]pyrene	1.6E-02	mg/kg						5.6E-13		6.E-13	6.5E-03	6.4E-04	6.5E-02	6.4E-03	1.9E-01	6.4E-02
Naphthalene	1.3E+01	mg/kg	6.8E-04		4.5E-04		9.2E-02	3.2E-06	9.3E-02	**3.E-06**	5.1E+00	5.1E-01	5.1E+01	5.1E+00	1.5E+02	5.1E+01
Phenanthrene	1.9E+00	mg/kg									7.5E-01	7.5E-02	7.5E+00	7.5E-01	2.3E+01	7.5E+00
Pyrene	5.0E-01	mg/kg	1.8E-05		1.2E-05				2.9E-05		2.0E-01	2.0E-02	2.0E+00	2.0E-01	6.0E+00	2.0E+00
CPAH	3.0E-01	mg/kg		7.9E-07		6.8E-07		1.0E-10		**1.E-06**	1.2E-01	1.2E-02	1.2E+00	1.2E-01	3.6E+00	1.2E+00
Total Chemical Hazard Index			**0.1**		**0.03**		**0.09**		**0.3**							
Total Chemical Risk				**2.E-05**		**4.E-06**		**3.E-06**		**3.E-05**						

Northeast Cape Re-evaluation of Human Health Risk, Site 28 Drainage Basin
Cleanup Levels

Risk Assessments Results for permanent Child residential exposures to soil at Site 28

Analyte	Exposure Point Concentration	Units	Ingestion Hazard Quotient	Ingestion Excess Cancer Risk	Dermal Contact Hazard Quotient	Dermal Contact Excess Cancer Risk	Inhalation Hazard Quotient	Inhalation Excess Cancer Risk	Total Scenario Hazard Index	Total Scenario Risk	RGO HI = 0.1	RGO 10^{-6}	RGO HI = 1.0	RGO 10^{-5}	RGO HI = 3.0	RGO 10^{-4}
Arsenic	3.1E+01	mg/kg	1.0E+00	3.9E-05	8.9E-02	3.3E-06	1.9E-03	1.0E-08	**1.1E+00**	**4.E-05**	2.2E+00	6.6E-01	2.2E+01	6.6E+00	6.5E+01	6.57E+01
Barium	1.1E+02	mg/kg	5.5E-03		1.5E-03		2.0E-04		7.3E-03		8.0E+00	2.4E+00	8.0E+01	2.4E+01	2.4E+02	2.40E+02
Cadmium	3.4E-01	mg/kg	3.4E-03		1.9E-05		1.6E-05	4.8E-11	3.4E-03	5.E-11	2.4E-02	7.3E-03	2.4E-01	7.3E-02	7.3E-01	7.31E-01
Chromium	1.8E+01	mg/kg	1.2E-04						1.2E-04		1.3E+00	3.9E-01	1.3E+01	3.9E+00	3.9E+01	3.87E+01
Lead	1.7E+01	mg/kg									1.2E+00	3.7E-01	1.2E+01	3.7E+00	3.6E+01	3.65E+01
Nickel	1.2E+01	mg/kg	5.8E-03				1.2E-04	2.4E-10	5.9E-03	2.E-10	8.4E-01	2.5E-01	8.4E+00	2.5E+00	2.5E+01	2.53E+01
Selenium	1.6E+00	mg/kg	3.2E-03				7.3E-08		3.2E-03		1.1E-01	3.4E-02	1.1E+00	3.4E-01	3.4E+00	3.44E+00
Silver	1.1E-01	mg/kg	2.2E-04						2.2E-04		8.1E-03	2.4E-03	8.1E-02	2.4E-02	2.4E-01	2.43E-01
Vanadium	3.3E+01	mg/kg	6.6E-02						6.6E-02		2.4E+00	7.2E-01	2.4E+01	7.2E+00	7.1E+01	7.17E+01
Zinc	9.4E+01	mg/kg	3.1E-03						3.1E-03		6.7E+00	2.0E+00	6.7E+01	2.0E+01	2.0E+02	2.02E+02
Mercury	1.0E-01	mg/kg	3.3E-03				3.1E-07		3.3E-03		7.2E-03	2.2E-03	7.2E-02	2.2E-02	2.2E-01	2.17E-01
PCB-1260	1.2E-01	mg/kg		2.0E-07		8.0E-08		5.4E-12		3.E-07	8.6E-03	2.6E-03	8.6E-02	2.6E-02	2.6E-01	2.60E-01
Benzene	3.2E-02	mg/kg	7.9E-05	1.5E-09	2.2E-05	4.2E-10	3.5E-04	7.1E-09	4.6E-04	9.E-09	2.3E-03	6.9E-04	2.3E-02	6.9E-03	6.9E-02	6.88E-02
Ethylbenzene	5.2E-01	mg/kg	5.1E-05	4.8E-09	1.4E-05	1.3E-09	1.2E-04	2.5E-08	1.8E-04	3.E-08	3.7E-02	1.1E-02	3.7E-01	1.1E-01	1.1E+00	1.11E+00
m,p-xylene	3.8E+00	mg/kg	1.9E-04		5.3E-05		3.5E-08		2.4E-04		2.7E-01	8.2E-02	2.7E+00	8.2E-01	8.2E+00	8.22E+00
o-xylene	1.7E+00	mg/kg	8.4E-05		2.4E-05		1.6E-08		1.1E-04		1.2E-01	3.7E-02	1.2E+00	3.7E-01	3.7E+00	3.67E+00
Total Xylenes	4.3E+00	mg/kg	2.1E-04		5.9E-05		3.9E-08		2.7E-04		3.1E-01	9.3E-02	3.1E+00	9.3E-01	9.2E+00	9.25E+00
1-Methylnaphthalene	2.8E+01	mg/kg	4.0E-03	6.9E-07	1.1E-03	1.9E-07			5.1E-03	9.E-07	2.0E+00	6.1E-01	2.0E+01	6.1E+00	6.0E+01	6.05E+01
2-Methylnaphthalene	3.4E+01	mg/kg	8.3E-02		2.3E-02				**1.1E-01**		2.4E+00	7.2E-01	2.4E+01	7.2E+00	7.2E+01	7.21E+01
Acenaphthene	1.5E+00	mg/kg	2.5E-04		9.2E-05				3.5E-04		1.1E-01	3.3E-02	1.1E+00	3.3E-01	3.3E+00	3.31E+00
Acenaphthylene	9.9E-01	mg/kg									7.1E-02	2.1E-02	7.1E-01	2.1E-01	2.1E+00	2.14E+00
Anthracene	6.6E-01	mg/kg	2.2E-05		7.9E-06				2.9E-05		4.7E-02	1.4E-02	4.7E-01	1.4E-01	1.4E+00	1.41E+00
Benzo[a]anthracene	7.1E-02	mg/kg						6.1E-13		6.E-13	5.1E-03	1.5E-03	5.1E-02	1.5E-02	1.5E-01	1.52E-01
Benzo[a]pyrene	3.2E-02	mg/kg						2.8E-12		3.E-12	2.3E-03	6.9E-04	2.3E-02	6.9E-03	6.8E-02	6.86E-02
Benzo[b]fluoranthene	7.0E-02	mg/kg						6.1E-13		6.E-13	5.0E-03	1.5E-03	5.0E-02	1.5E-02	1.5E-01	1.51E-01
Benzo[g,h,i]perylene	1.4E-02	mg/kg									9.9E-04	3.0E-04	9.9E-03	3.0E-03	3.0E-02	2.97E-02
Benzo[k]fluoranthene	2.4E-02	mg/kg						2.1E-13		2.E-13	1.7E-03	5.1E-04	1.7E-02	5.1E-03	5.1E-02	5.12E-02
Chrysene	1.9E-01	mg/kg									1.3E-02	4.1E-03	1.3E-01	4.1E-02	4.0E-01	4.06E-01
Dibenz(a,h)anthracene	1.1E-02	mg/kg									7.9E-04	2.4E-04	7.9E-03	2.4E-03	2.4E-02	2.37E-02
Fluoranthene	7.8E-01	mg/kg	1.9E-04		7.0E-05				2.6E-04		5.6E-02	1.7E-02	5.6E-01	1.7E-01	1.7E+00	1.67E+00
Fluorene	3.6E+00	mg/kg	8.9E-04		3.3E-04				1.2E-03		2.6E-01	7.8E-02	2.6E+00	7.8E-01	7.8E+00	7.80E+00
Indeno[1,2,3-cd]pyrene	1.6E-02	mg/kg						1.4E-13		1.E-13	1.2E-03	3.5E-04	1.2E-02	3.5E-03	3.5E-02	3.50E-02
Naphthalene	1.3E+01	mg/kg	6.3E-03		1.8E-03		9.2E-02	8.0E-07	1.0E-01	8.E-07	9.2E-01	2.8E-01	9.2E+00	2.8E+00	2.8E+01	2.76E+01
Phenanthrene	1.9E+00	mg/kg									1.4E-01	4.1E-02	1.4E+00	4.1E-01	4.1E+00	4.08E+00
Pyrene	5.0E-01	mg/kg	1.7E-04		4.6E-05				2.1E-04		3.6E-02	1.1E-02	3.6E-01	1.1E-01	1.1E+00	1.08E+00
CPAH	3.0E-01	mg/kg		1.8E-06		6.7E-07		2.6E-11		**3.E-06**	2.1E-02	6.4E-03	2.1E-01	6.4E-02	6.4E-01	6.41E-01
Total Chemical Hazard Index			**1**		**0.1**		**0.09**		**1**							
Total Chemical Risk				**4.E-05**		**4.E-06**		**8.E-07**		**5.E-05**						

Northeast Cape Re-evaluation of Human Health Risk, Site 28 Drainage Basin
Cleanup Levels

Risk Assessments Results for Adult seasonal residential exposures to soil at Site 28

Analyte	Exposure Point Concentration	Units	Ingestion Hazard Quotient	Ingestion Excess Cancer Risk	Dermal Contact Hazard Quotient	Dermal Contact Excess Cancer Risk	Inhalation Hazard Quotient	Inhalation Excess Cancer Risk	Total Scenario Hazard Index	Total Scenario Risk	RGO HI = 0.1	RGO 10^{-6}	RGO HI = 1.0	RGO 10^{-5}	RGO HI = 3.0	RGO 10^{-4}
Arsenic	3.1E+01	mg/kg	3.6E-02	5.5E-06	7.5E-03	1.1E-06	4.1E-13	9.1E-18	4.3E-02	**6.6E-06**	5.8E+01	4.2E+00	5.8E+02	4.2E+01	1.8E+03	4.16E+02
Barium	1.1E+02	mg/kg	2.0E-04		1.3E-04		4.5E-14		3.3E-04		2.1E+02	1.5E+01	2.1E+03	1.5E+02	6.4E+03	1.52E+03
Cadmium	3.4E-01	mg/kg	1.2E-04		1.6E-06		3.4E-15	4.2E-20	1.2E-04	4.2E-20	6.5E-01	4.6E-02	6.5E+00	4.6E-01	1.9E+01	4.63E+00
Chromium	1.8E+01	mg/kg	4.2E-06						4.2E-06		3.4E+01	2.5E+00	3.4E+02	2.5E+01	1.0E+03	2.46E+02
Lead	1.7E+01	mg/kg									3.2E+01	2.3E+00	3.2E+02	2.3E+01	9.7E+02	2.31E+02
Nickel	1.2E+01	mg/kg	2.1E-04				2.7E-14	2.1E-19	2.1E-04	2.1E-19	2.3E+01	1.6E+00	2.3E+02	1.6E+01	6.8E+02	1.61E+02
Selenium	1.6E+00	mg/kg	1.1E-04				1.6E-17		1.1E-04		3.1E+00	2.2E-01	3.1E+01	2.2E+00	9.2E+01	2.18E+01
Silver	1.1E-01	mg/kg	8.0E-06						8.0E-06		2.2E-01	1.5E-02	2.2E+00	1.5E-01	6.5E+00	1.54E+00
Vanadium	3.3E+01	mg/kg	2.3E-03						2.3E-03		6.4E+01	4.5E+00	6.4E+02	4.5E+01	1.9E+03	4.54E+02
Zinc	9.4E+01	mg/kg	1.1E-04						1.1E-04		1.8E+02	1.3E+01	1.8E+03	1.3E+02	5.4E+03	1.28E+03
Mercury	1.0E-01	mg/kg	1.2E-04				6.8E-17		1.2E-04		1.9E-01	1.4E-02	1.9E+00	1.4E-01	5.8E+00	1.38E+00
PCB-1260	1.2E-01	mg/kg		2.9E-08		2.7E-08		4.8E-21		5.6E-08	2.3E-01	1.6E-02	2.3E+00	1.6E-01	6.9E+00	1.65E+00
Benzene	3.2E-02	mg/kg	2.8E-06	2.1E-10	1.9E-06	1.4E-10	7.8E-14	6.3E-18	4.7E-06	3.5E-10	6.1E-02	4.4E-03	6.1E-01	4.4E-02	1.8E+00	4.36E-01
Ethylbenzene	5.2E-01	mg/kg	1.8E-06	6.9E-10	1.2E-06	4.5E-10	2.5E-14	2.2E-17	3.0E-06	1.1E-09	9.9E-01	7.0E-02	9.9E+00	7.0E-01	3.0E+01	7.05E+00
m,p-xylene	3.8E+00	mg/kg	6.7E-06		4.4E-06		7.7E-18		1.1E-05		7.3E+00	5.2E-01	7.3E+01	5.2E+00	2.2E+02	5.21E+01
o-xylene	1.7E+00	mg/kg	3.0E-06		2.0E-06		3.5E-18		5.0E-06		3.3E+00	2.3E-01	3.3E+01	2.3E+00	9.8E+01	2.33E+01
Total Xylenes	4.3E+00	mg/kg	7.6E-06		5.0E-06		8.7E-18		1.3E-05		8.2E+00	5.9E-01	8.2E+01	5.9E+00	2.5E+02	5.86E+01
1-Methylnaphthalene	2.8E+01	mg/kg	1.4E-04	9.9E-08	9.4E-05	6.5E-08			2.4E-04	1.6E-07	5.4E+01	3.8E+00	5.4E+02	3.8E+01	1.6E+03	3.84E+02
2-Methylnaphthalene	3.4E+01	mg/kg	3.0E-03		1.9E-03				4.9E-03		6.4E+01	4.6E+00	6.4E+02	4.6E+01	1.9E+03	4.57E+02
Acenaphthene	1.5E+00	mg/kg	9.0E-06		7.8E-06				1.7E-05		2.9E+00	2.1E-01	2.9E+01	2.1E+00	8.8E+01	2.10E+01
Acenaphthylene	9.9E-01	mg/kg									1.9E+00	1.4E-01	1.9E+01	1.4E+00	5.7E+01	1.35E+01
Anthracene	6.6E-01	mg/kg	7.7E-07		6.6E-07				1.4E-06		1.3E+00	8.9E-02	1.3E+01	8.9E-01	3.8E+01	8.94E+00
Benzo[a]anthracene	7.1E-02	mg/kg						5.4E-22		5.4E-22	1.4E-01	9.6E-03	1.4E+00	9.6E-02	4.1E+00	9.65E-01
Benzo[a]pyrene	3.2E-02	mg/kg						2.4E-21		2.4E-21	6.1E-02	4.3E-03	6.1E-01	4.3E-02	1.8E+00	4.35E-01
Benzo[b]fluoranthene	7.0E-02	mg/kg						5.4E-22		5.4E-22	1.3E-01	9.6E-03	1.3E+00	9.6E-02	4.0E+00	9.59E-01
Benzo[g,h,i]perylene	1.4E-02	mg/kg									2.6E-02	1.9E-03	2.6E-01	1.9E-02	7.9E-01	1.88E-01
Benzo[k]fluoranthene	2.4E-02	mg/kg						1.8E-22		1.8E-22	4.5E-02	3.2E-03	4.5E-01	3.2E-02	1.4E+00	3.24E-01
Chrysene	1.9E-01	mg/kg									3.6E-01	2.6E-02	3.6E+00	2.6E-01	1.1E+01	2.58E+00
Dibenz(a,h)anthracene	1.1E-02	mg/kg									2.1E-02	1.5E-03	2.1E-01	1.5E-02	6.3E-01	1.50E-01
Fluoranthene	7.8E-01	mg/kg	6.9E-06		5.9E-06				1.3E-05		1.5E+00	1.1E-01	1.5E+01	1.1E+00	4.5E+01	1.06E+01
Fluorene	3.6E+00	mg/kg	3.2E-05		2.7E-05				5.9E-05		6.9E+00	4.9E-01	6.9E+01	4.9E+00	2.1E+02	4.94E+01
Indeno[1,2,3-cd]pyrene	1.6E-02	mg/kg						1.2E-22		1.2E-22	3.1E-02	2.2E-03	3.1E-01	2.2E-02	9.3E-01	2.22E-01
Naphthalene	1.3E+01	mg/kg	2.3E-04		1.5E-04		2.0E-11	7.1E-16	3.8E-04	7.1E-16	2.5E+01	1.8E+00	2.5E+02	1.8E+01	7.4E+02	1.75E+02
Phenanthrene	1.9E+00	mg/kg									3.6E+00	2.6E-01	3.6E+01	2.6E+00	1.1E+02	2.58E+01
Pyrene	5.0E-01	mg/kg	5.9E-06		3.9E-06				9.8E-06		9.6E-01	6.9E-02	9.6E+00	6.9E-01	2.9E+01	6.86E+00
CPAH	3.0E-01	mg/kg		2.6E-07		2.3E-07		2.3E-20		4.9E-07	5.7E-01	4.1E-02	5.7E+00	4.1E-01	1.7E+01	4.06E+00
Total Chemical Hazard Index			**4.2E-02**		**9.9E-03**		**2.1E-11**		**5.2E-02**							
Total Chemical Risk				**5.9E-06**		**1.4E-06**		**7.5E-16**		**7.3E-06**						

Northeast Cape Re-evaluation of Human Health Risk, Site 28 Drainage Basin
Cleanup Levels

Risk Assessments Results for Child seasonal residential exposures to subsurface soil at Site 28

Analyte	Exposure Point Concentration	Units	Ingestion Hazard Quotient	Ingestion Excess Cancer Risk	Dermal Contact Hazard Quotient	Dermal Contact Excess Cancer Risk	Inhalation Hazard Quotient	Inhalation Excess Cancer Risk	Total Scenario Hazard Index	Total Scenario Risk	RGO HI = 0.1	RGO 10^{-6}	RGO HI = 1.0	RGO 10^{-5}	RGO HI = 3.0	RGO 10^{-4}
Arsenic	3.1E+01	mg/kg	3.3E-01	1.3E-05	3.0E-02	1.1E-06	4.1E-13	2.3E-18	**3.6E-01**	**1.4E-05**	7.0E+00	2.0E+00	7.0E+01	2.0E+01	2.1E+02	2.01E+02
Barium	1.1E+02	mg/kg	1.8E-03		5.1E-04		4.5E-14		2.4E-03		2.6E+01	7.3E+00	2.6E+02	7.3E+01	7.7E+02	7.34E+02
Cadmium	3.4E-01	mg/kg	1.1E-03		6.3E-06		3.4E-15	1.1E-20	1.1E-03	1.1E-20	7.8E-02	2.2E-02	7.8E-01	2.2E-01	2.3E+00	2.23E+00
Chromium	1.8E+01	mg/kg	3.9E-05						3.9E-05		4.1E+00	1.2E+00	4.1E+01	1.2E+01	1.2E+02	1.18E+02
Lead	1.7E+01	mg/kg									3.9E+00	1.1E+00	3.9E+01	1.1E+01	1.2E+02	1.12E+02
Nickel	1.2E+01	mg/kg	1.9E-03				2.7E-14	5.3E-20	1.9E-03	5.3E-20	2.7E+00	7.7E-01	2.7E+01	7.7E+00	8.1E+01	7.75E+01
Selenium	1.6E+00	mg/kg	1.1E-03				1.6E-17		1.1E-03		3.7E-01	1.1E-01	3.7E+00	1.1E+00	1.1E+01	1.05E+01
Silver	1.1E-01	mg/kg	7.4E-05						7.4E-05		2.6E-02	7.4E-03	2.6E-01	7.4E-02	7.8E-01	7.42E-01
Vanadium	3.3E+01	mg/kg	2.2E-02						2.2E-02		7.7E+00	2.2E+00	7.7E+01	2.2E+01	2.3E+02	2.19E+02
Zinc	9.4E+01	mg/kg	1.0E-03						1.0E-03		2.2E+01	6.2E+00	2.2E+02	6.2E+01	6.5E+02	6.16E+02
Mercury	1.0E-01	mg/kg	1.1E-03				6.8E-17		1.1E-03		2.3E-02	6.6E-03	2.3E-01	6.6E-02	7.0E-01	6.64E-01
PCB-1260	1.2E-01	mg/kg		6.8E-08		2.7E-08		1.2E-21		9.5E-08	2.8E-02	7.9E-03	2.8E-01	7.9E-02	8.3E-01	7.95E-01
Benzene	3.2E-02	mg/kg	2.6E-05	5.0E-10	7.4E-06	1.4E-10	7.8E-14	1.6E-18	3.4E-05	6.3E-10	7.3E-03	2.1E-03	7.3E-02	2.1E-02	2.2E-01	2.10E-01
Ethylbenzene	5.2E-01	mg/kg	1.7E-05	1.6E-09	4.8E-06	4.5E-10	2.5E-14	5.5E-18	2.2E-05	2.1E-09	1.2E-01	3.4E-02	1.2E+00	3.4E-01	3.6E+00	3.40E+00
m,p-xylene	3.8E+00	mg/kg	6.3E-05		1.8E-05		7.7E-18		8.0E-05		8.8E-01	2.5E-01	8.8E+00	2.5E+00	2.6E+01	2.51E+01
o-xylene	1.7E+00	mg/kg	2.8E-05		7.9E-06		3.5E-18		3.6E-05		3.9E-01	1.1E-01	3.9E+00	1.1E+00	1.2E+01	1.12E+01
Total Xylenes	4.3E+00	mg/kg	7.1E-05		2.0E-05		8.7E-18		9.1E-05		9.9E-01	2.8E-01	9.9E+00	2.8E+00	3.0E+01	2.83E+01
1-Methylnaphthalene	2.8E+01	mg/kg	1.3E-03	2.3E-07	3.7E-04	6.4E-08			1.7E-03	2.9E-07	6.5E+00	1.8E+00	6.5E+01	1.8E+01	1.9E+02	1.85E+02
2-Methylnaphthalene	3.4E+01	mg/kg	2.8E-02		7.7E-03				3.5E-02		7.7E+00	2.2E+00	7.7E+01	2.2E+01	2.3E+02	2.20E+02
Acenaphthene	1.5E+00	mg/kg	8.4E-05		3.1E-05				1.2E-04		3.5E-01	1.0E-01	3.5E+00	1.0E+00	1.1E+01	1.01E+01
Acenaphthylene	9.9E-01	mg/kg									2.3E-01	6.5E-02	2.3E+00	6.5E-01	6.8E+00	6.53E+00
Anthracene	6.6E-01	mg/kg	7.2E-06		2.6E-06				9.8E-06		1.5E-01	4.3E-02	1.5E+00	4.3E-01	4.5E+00	4.31E+00
Benzo[a]anthracene	7.1E-02	mg/kg						1.4E-22		1.4E-22	1.6E-02	4.7E-03	1.6E-01	4.7E-02	4.9E-01	4.65E-01
Benzo[a]pyrene	3.2E-02	mg/kg						6.1E-22		6.1E-22	7.3E-03	2.1E-03	7.3E-02	2.1E-02	2.2E-01	2.10E-01
Benzo[b]fluoranthene	7.0E-02	mg/kg						1.3E-22		1.3E-22	1.6E-02	4.6E-03	1.6E-01	4.6E-02	4.8E-01	4.62E-01
Benzo[g,h,i]perylene	1.4E-02	mg/kg									3.2E-03	9.1E-04	3.2E-02	9.1E-03	9.5E-02	9.07E-02
Benzo[k]fluoranthene	2.4E-02	mg/kg						4.5E-23		4.5E-23	5.5E-03	1.6E-03	5.5E-02	1.6E-02	1.6E-01	1.56E-01
Chrysene	1.9E-01	mg/kg									4.3E-02	1.2E-02	4.3E-01	1.2E-01	1.3E+00	1.24E+00
Dibenz(a,h)anthracene	1.1E-02	mg/kg									2.5E-03	7.2E-04	2.5E-02	7.2E-03	7.6E-02	7.23E-02
Fluoranthene	7.8E-01	mg/kg	6.4E-05		2.3E-05				8.7E-05		1.8E-01	5.1E-02	1.8E+00	5.1E-01	5.4E+00	5.12E+00
Fluorene	3.6E+00	mg/kg	3.0E-04		1.1E-04				4.1E-04		8.3E-01	2.4E-01	8.3E+00	2.4E+00	2.5E+01	2.38E+01
Indeno[1,2,3-cd]pyrene	1.6E-02	mg/kg						3.1E-23		3.1E-23	3.7E-03	1.1E-03	3.7E-02	1.1E-02	1.1E-01	1.07E-01
Naphthalene	1.3E+01	mg/kg	2.1E-03		5.9E-04		2.0E-11	1.8E-16	2.7E-03	1.8E-16	3.0E+00	8.4E-01	3.0E+01	8.4E+00	8.9E+01	8.44E+01
Phenanthrene	1.9E+00	mg/kg									4.4E-01	1.2E-01	4.4E+00	1.2E+00	1.3E+01	1.25E+01
Pyrene	5.0E-01	mg/kg	5.5E-05		1.5E-05				7.1E-05		1.2E-01	3.3E-02	1.2E+00	3.3E-01	3.5E+00	3.30E+00
CPAH	3.0E-01	mg/kg		6.1E-07		2.2E-07		5.7E-21		8.4E-07	6.8E-02	2.0E-02	6.8E-01	2.0E-01	2.1E+00	1.96E+00
Total Chemical Hazard Index			**4.0E-01**		**3.9E-02**		**2.1E-11**		**4.4E-01**							
Total Chemical Risk				**1.4E-05**		**1.4E-06**		**1.9E-16**		**1.5E-05**						