HUMAN HEALTH RISK ASSESSMENT
Final

SHAFFER EQUIPMENT COMPANY PROPERTY
SHAFFER EQUIPMENT/ARBUCKLE CREEK AREA
SUPERFUND SITE
FAYETTE COUNTY, MINDEN, WEST VIRGINIA

EPA RAF DES CLIN 0001 CONTRACT 68HE0318D0013
TASK ORDER 68HE0321F0039

FOR

US Environmental Protection Agency
Region 3

BY
NOBIS GROUP®

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Nobis Project No. D00004

8 August 2022

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ACRONYMS AND ABBREVIATIONS

2,3,7,8-TCDD	2,3,7,8-tetrachloro-dibenzo-*p*-dioxin
ABS	Dermal Absorption Factors
ADAF	Age-Dependent Adjustment Factor
ADD	Average Daily Dose
AF	Soil-to-Skin Adherence Factor
AOC	Area of Concern
A_R	Surface Area of Contaminated Road Segment
AT	Averaging Time
ATSDR	Agency for Toxic Substances and Disease Registry
BCA	Bias – Corrected Accelerated
bgs	below ground surface
Bluestone	Bluestone Environmental Group, Inc.
BW	Body Weight
CA	Concentration in Air
CADD	Chronic Average Daily Dose
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	Conversion factor
CLT	Central Limit Theorem
cm^2	square centimeter
COPC	Chemical of Potential Concern
CRQL	Contract Required Quantitation Limit
CS	Concentration in Soil
CSF	Cancer Slope Factors
CSM	conceptual site model
CTE	Central Tendency Exposure
DAD	Dermally Absorbed Dose
DA_{event}	Absorbed Dose per Event
ED	Exposure Duration
EF	Exposure Frequency
EPA	U.S. Environmental Protection Agency
EPC	Exposure Point Concentration
EV	Event Frequency
FFS	Focused Feasibility Study
FI-S	Fraction Ingested
ft	feet
HEAST	Health Effects Assessment Summary Tables

ACRONYMS AND ABBREVIATIONS (cont.)

HHEM	Human Health Evaluation Manual
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ILCR	Incremental Lifetime Cancer Risk
IUR	Inhalation Unit Risk
IRIS	Integrated Risk Information System
IR	Soil Ingestion Rate
kg	kilogram
KM	Kaplan-Meier
LADD	Lifetime Average Daily Dose
LOAEL	Lowest-Observed-Adverse-Effect-Level
mg	milligram
mg/cm^2-event	milligrams per square centimeter per event
mg/day	milligrams per day
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
mg/m^3	Milligram per cubic meter
MVUE	Minimum Variance Un-biased Estimators
NCEA	National Center for Environmental Assessment
NOAEL	No-Observed-Adverse-Effect-Level
Nobis	Nobis Engineering, Inc. (dba Nobis Group®)
NRC	National Research Council
OABS	Oral Absorption Factors
OPP	Office of Pesticide Programs
OSWER	Office of Solid Waste and Emergency Response
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PEF	Particulate Emission Factor
PPRTV	Provisional Peer Reviewed Toxicity Value
RAGS	Risk Assessment Guidance for Superfund
RBA	Relative Bioavailability Factor
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
RME	Reasonable Maximum Exposure

ACRONYMS AND ABBREVIATIONS (cont.)

ROS	Regression on Order Statistics
RSL	Regional Screening Levels
SA	Surface Area
SEC	Shaffer Equipment Company
SARA	Superfund Amendments and Reauthorization Act
Site	Shaffer Equipment/Arbuckle Creek Area Superfund Site
STSC	Superfund Health Risk Technical Support Center
Study Area	Shaffer Equipment/Arbuckle Creek Area Superfund Site Study Area
T	Time Over Which Construction Occurs
TEF	Toxicity Equivalency Factor
TEQ	Toxicity Equivalent
UCL	95 percent upper confidence limit on the mean
$\mu g/m^3$	Microgram per cubic meter
VOC	Volatile Organic Compound
VF	Volatilization Factor
WVDNR	West Virginia Department of Natural Resources
WVDEP	West Virginia Department of Environmental Protection

1.0 INTRODUCTION

Nobis Engineering, Inc. (dba Nobis Group® [Nobis]), and Bluestone Environmental Group, Inc. (Bluestone) have prepared this Human Health Risk Assessment (HHRA) Report for the United States Environmental Protection Agency (EPA) in support of a Focused Feasibility Study (FFS) for soil at the Shaffer Equipment Company (SEC) Property portion of the Shaffer Equipment/Arbuckle Creek Area Superfund Site (the Site) in Minden, Fayette County, West Virginia (Figure 1-1). The HHRA was completed under EPA Contract No. 68HE0318D0013, Task Order No. 68HE0321F0039. This HHRA was developed consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 under the authority of EPA Region 3.

The *Phase I Remedial Activities Data Summary Technical Memorandum* (Tetra Tech, 2020) and the *Sampling and Analysis Plan for Remedial Investigation Activities, Revision 4* (Nobis, 2021) present the remedial investigation methods, summaries of the Site's geology and hydrogeology, the nature and extent of contamination in environmental media, and contaminant fate and transport.

1.1 Receptors and Exposure Areas

Based on previously conducted investigations, areas of concern (AOCs) have been identified within the Site, including the Possible Transformer Storage Area, Britt Bath House, and NR&P Supply House. The AOC evaluated in this HHRA encompasses surface and subsurface soil at the Former Shaffer Equipment Company (SEC) Property and perimeter soil samples extending beyond the eastern, western, and southern property boundary and to the north along Arbuckle Creek. Refer to Figure 1-2 for the Site Plan and Layout. Risk associated with groundwater and surface water exposure will be evaluated in a separate document.

Currently, the land is vacant and is not used for industrial, commercial, or residential purposes. Five potential receptor populations were identified for risk-based evaluation under a reasonable maximum exposure (RME) scenario:

The receptors evaluated include:

- Adult and child recreators;
- Adolescent trespasser;
- Adult and child residents;
- Industrial worker (composite worker); and
- Construction worker.

1.2 Exposure Assumptions and Risk Results

The SEC Property is privately owned, and access to the property is not restricted. The public uses the area for driving recreational all-terrain vehicles. Recreational users may also use areas along Arbuckle Creek, which flows through the New River Gorge National Park and Preserve. No industrial or commercial activities are currently conducted at the AOC. There are residential properties located along Arbuckle Creek.

The adult and child recreators and the adolescent trespasser (ages 6-16) are assumed to contact surface soil, defined as soils in the upper six inches of the soil column. Potentially complete exposure pathways for the adult and child recreators and adolescent trespasser include incidental ingestion of soil, dermal exposure to soil, inhalation of fugitive dust from windblown erosion, and inhalation of vapors in ambient air.

Future land use is expected to remain the same as current land use. However, potential future users could also include residents (adult/child) if the property were to be developed. Therefore, onsite adult and child residents were included in the HHRA to inform remedial decision-making. Adult and child residents are assumed to come in contact with surface, near-surface, and subsurface soils to a maximum depth of the Site soil data, 8.8 feet below ground surface (ft bgs). Potentially complete exposure pathways for the resident include incidental ingestion of soil, dermal exposure to soil, and inhalation of fugitive dust and ambient vapor.

As a result of the potential for future industrial use of the Site, industrial workers were considered appropriate receptors to be evaluated. The industrial worker is potentially exposed to chemicals of potential concern in surface and near-surface soil (0- 2 ft bgs). Potentially complete exposure pathways for the industrial worker include incidental ingestion of soil, dermal exposure to soil, and inhalation of fugitive dust and ambient vapor.

Although it is not definitively known if future use of the Site will entail construction activities, a construction worker scenario is included in the HHRA to account for this possibility. The construction worker is assumed to come in contact with surface, near-surface, and subsurface soils to a maximum depth of 8.8 ft bgs. Potentially complete exposure pathways for the construction worker include incidental ingestion of soil, dermal exposure to soil, and inhalation of fugitive dust from truck traffic on unpaved roads, and inhalation of ambient vapor.

Risk results associated with RME scenarios are summarized below and in Table 6-1. Central Tendency Exposure (CTE) was not evaluated because: 1) EPA is making decisions based on the more protective RME scenario and 2) RME risk and hazard estimates are acceptable. Cancer risk results are compared with EPA's acceptable incremental lifetime cancer risk (ILCR) range of 1E-

06 to 1E-04; noncancer hazards are compared with an unsegregated hazard index (HI) threshold level of unity. Segregated target organ HIs are discussed in Section 6.

- Adult Recreator – HI = 0.05;
- Child Recreator – HI = 0.4;
- Lifetime Recreator – ICLR = 2E-05;
- Adolescent Trespasser – ICLR = 6E-07 and HI = 0.01;
- Adult Resident;
    - 0 – 0.5 ft bgs – HI = 0.3
    - 0 – 8.8 ft bgs – HI = 0.3
- Child Resident;
    - 0 – 0.5 ft bgs – HI (unsegregated) = 3
    - 0 – 8.8 ft bgs – HI (unsegregated) = 3
    - All segregated HIs < 1
- Lifetime Resident;
    - 0 – 0.5 ft bgs – ICLR = 1E-04
    - 0 – 8.8 ft bgs – ICLR = 1E-04
    - ICLR = 2E-04 when evaluating the Aroclor 1260 "hotspot"
- Industrial Worker – ICLR= 2E-05 and HI = 0.3
    - ICLR = 4E-05 when evaluating the Aroclor 1260 "hotspot"
- Construction Worker – ICLR = 2E-06 and HI = 0.6
    - ICLR = 5E-06 when evaluating the Aroclor 1260 "hotspot"

1.3 Site and Study Area

The SEC was in operation from 1970 until 1983 at a facility located off of Old Minden Road on the western end of Minden, Fayette Country, West Virginia. The former SEC Property is approximately 5 acres, and is located within the floodplain of Arbuckle Creek, which borders the property to the north. The SEC property is in a valley with a steep hillside south of the property and slopes down slightly to the north towards Arbuckle Creek. Arbuckle Creek flows east through residential properties for one mile, then flows two miles through New River Gorge National Park and Preserve to its confluence with the New River. Historically, the creek floods four to five times a year. For this HHRA, the Study Area encompasses the onsite property and associated delineation soil borings.

1.4 Site History

SEC built electrical substations for the coal mining industry. Mismanagement of polychlorinated biphenyl (PCB)-containing electrical transformers resulted in the release of PCBs to the environment during operations. In a 1984 inspection of the SEC facility, the West Virginia Department of Natural Resources (WVDNR) now the West Virginia Department of

Environmental Protection (WVDEP) and EPA observed that hundreds of transformers and capacitors across the property were resting on their sides, some with broken insulators and evidence of heavy oil spillage on the ground surface.

Historical activities at SEC, including the mismanagement of PCB-containing electrical transformers, resulted in the release of PCBs to the environment. Contaminated soil and sediment from the Site have also been transported offsite via the periodic flooding of Arbuckle Creek and the dredging of sediment in Arbuckle Creek. In addition, PCB-contaminated soil is reported to have been used for dust suppression along Rocklick Road. EPA has performed several soil removal actions to address PCB contamination at the SEC Property (Nobis, 2021). An impervious cap was also installed over contaminated soil along portions of Arbuckle Creek to eliminate migration of contaminants from the Site (Figure 1-2).

1.5 Report Organization

Section 1.0 describes the Site and the Study Area and summarizes the Site history. Section 2.0 provides an overview of the risk assessment process. Sections 3.0 through 8.0 detail the methodology and results of the HHRA. Appendices A through F present supporting materials for the HHRA. This risk assessment uses EPA policy and guidance to evaluate current and future potential risks. Tables documenting the HHRA were prepared following the standard format in accordance with *Risk Assessment Guidance for Superfund (RAGS), Human Health Evaluation Manual (HHEM) Part D* (EPA, 2001). These tables are presented in Appendix A.

2.0 OVERVIEW OF RISK ASSESSMENT PROCESS

EPA uses risk assessment to characterize the contaminants, evaluate the toxicity of the chemicals, assess the potential ways in which an individual may be exposed to the contaminants, and characterize the cancer risks and non-cancer health hazards. A risk assessment framework was first outlined in 1983 by the National Academy of Science, National Research Council (NRC, 1983). Building on that framework, EPA developed *RAGS HHEM Part A* (EPA, 1989), which describes the four main components of risk assessment:

- data evaluation and identification of chemicals of potential concern (COPCs);
- exposure assessment;
- toxicity assessment; and,
- risk characterization.

Actions at Superfund sites are based on an estimate of the reasonable maximum exposure expected to occur under both current and future conditions at the site. The RME is defined as the highest exposure that is reasonably expected to occur at a site.

For cancer risks and non-cancer health hazards to be present, a complete exposure pathway for chemical contact and intake must exist. A complete pathway requires: a source of contaminants with toxic characteristics in environmental media; a release of contaminants by either natural processes or by human action; potential exposure points at the source or via migration pathways; and exposure routes (i.e., ingestion, dermal absorption, inhalation). Risk is a function of both toxicity and exposure. If any one of the requirements listed above is absent for a specific site, the exposure pathway is regarded as incomplete, and no potential risks are considered for human receptors.

In the data evaluation component of the HHRA, the nature and extent of contamination is characterized, a risk-based screening is used to select COPCs, and exposure point concentrations (EPCs) are calculated. Study Area data are used in developing a list of COPCs. The medium/area-specific data are compared with medium-specific reference concentrations including conservative risk-based screening levels, and COPCs are selected for each medium, which are representative of the type of expected potential human health exposure. EPCs are calculated for all identified COPCs for each potential exposure type. The EPC is a conservative estimate of the average concentration an individual may be exposed to over time. A discussion of the data evaluation process and site-specific issues is contained in Section 3.0.

The exposure assessment identifies potential human exposure pathways (e.g., ingestion and dermal absorption). Exposure routes are identified by medium (i.e., surface, near surface, and subsurface soil), based on information on Study Area chemical concentrations, chemical release mechanisms, human activity patterns, and other pertinent information. A discussion of the exposure assessment is contained in Section 4.0. A summary of the potentially significant exposures identified for quantitative evaluation is provided in Table 2-1 (the same table is also included in Appendix A as Table A-1).

The toxicity assessment presents the available human health dose-response toxicity values for all the selected COPCs. This assessment is contained in Section 5.0. A discussion of health effects and dose-response parameters, such as reference doses (RfDs) and cancer slope factors (CSFs) are presented.

The risk characterization section (Section 6.0) describes how the estimated intakes are combined with the toxicity information to estimate risks. Uncertainties associated with the risk assessment process are discussed qualitatively in Section 7.0. Section 8.0 summarizes the HHRA results.

3.0 DATA EVALUATION

Data evaluation is a site-specific task that uses a variety of information to determine which of the detected chemicals in each medium are most likely to present a risk to potential receptors based on toxicity and detected concentrations. This section presents the approaches for identification of COPCs, distributional analysis of the data, and derivation of EPCs.

The methodology used to identify COPCs for this HHRA and the identified COPCs for each soil interval are provided in Section 3.1. The methodologies used to determine EPCs for the selected COPCs are presented in Section 3.2. The end result of this selection process is a list of COPCs and representative EPCs. EPCs are defined as the contaminant concentrations at the point of exposure.

The media of human health concern selected for the Study Area are as follows:

- Surface Soil
- Near-surface Soil
- Subsurface Soil

Soil samples from the AOC that were included in the HHRA were collected from 0 to 0.5 ft bgs, 0.5 to 2 ft bgs, and greater than 2 ft bgs during November 2019 and July 2021. These samples represent soil to which current or future onsite receptors may be exposed. Data utilized in this risk assessment consist of validated analytical results of known and sufficient quality for use in quantitative risk calculations. The data were validated in accordance with the procedures developed in Worksheet #36 of the SAP for Remedial Investigation (RI) Activities (Nobis, 2021). Analytical results qualified as rejected, "R," during the data validation process, were not considered because of their potential unreliability. Estimated values (J-qualified) were used as the reported value. All U-qualified results represent non-detectible concentrations (non-detects) for the parameter evaluated. Blank-qualified results were treated as non-detects. The full Contract Required Quantitation Limit (CRQL) value was used for non-detect results when presenting sample data and when calculating summary statistics. Note, the summary statistic calculations are different from Upper Confidence Limit (UCL) calculations where ProUCL determines concentrations to use for censored (i.e., non-detect) data (Section 3.2). If sample duplicates were collected and analyzed and one was a detection and the other was not, the detected concentration was used. If the results of a duplicate pair were similar (i.e., both detected or both non-detected), the higher of the two concentrations or CRQLs was used.

Appendix B provides lists of sample locations included in the HHRA for each exposure point. Soil sample locations are shown on Figure 3-1.

3.1 Selection of Chemicals of Potential Concern (COPCs)

The selection of COPCs is a risk-based screening step to identify chemicals that should be included in the quantitative risk assessment. The selection of COPCs was based on information regarding chemical substances found at the Study Area including chemical-specific concentrations, occurrence, distribution, and toxicity. COPCs include only those chemicals with positive detections and are limited to those chemicals that exceed the selection criterion. The selection criteria [EPA Regional Screening Levels (RSLs) (EPA, 2021a)] were used to reduce the number of chemicals considered in the risk assessment. Screening levels based on residential exposure assumptions were used for this HHRA as a conservative screening tool to be protective of all potential current and future Site uses. Screening levels based on residential exposure assumptions are very conservative for screening soil for recreators, trespasser, and worker populations.

A chemical was selected as a COPC if the maximum detected concentration was greater than the associated COPC screening level. Frequency of detection was not considered in COPC selection.

The criteria used to identify COPCs are presented in Appendix A, Tables A-2.1 through A-2.3. The WVDEP De Minimis Standards are also presented in the tables for comparison purposes (WVDEP, 2021). Discussions of the criteria used for COPC selection are provided in the remainder of this section.

Criteria for the Selection of COPCs in Soil

The following screening criteria were used to identify soil COPCs:

- **EPA RSLs for Soil Exposures.** The maximum concentration detected in surface, near-surface, and subsurface soil were compared with EPA RSLs for residential soil (EPA, 2021a) as described below. The EPA RSL Table identifies concentrations of potential concern for nearly 800 chemicals in various media (air, drinking water, and soil) using reasonable maximum exposure default assumptions.

  The EPA RSL residential soil exposure values were developed by EPA based on the methodology presented in *RAGS HHEM, Part B* (EPA, 1991) and consider the ingestion, dermal, and inhalation exposure routes. The EPA RSL residential soil exposure values for carcinogens were developed by EPA using an age-adjusted exposure equation, which assumes that a receptor is exposed to soil at a frequency of 350 days per year for a 26-year exposure period (6 years as a child and 20 years as an adult). The EPA RSL criteria for chemicals with non-cancer effects are based on a child exposed to soil at a frequency of 350 days per year for a 6-year exposure period.

For carcinogenic chemicals, the values used for COPC screening are based on a 1E-06 target ILCR. EPA RSLs for chemicals with non-cancer effects are developed for target hazard quotient (HQ) of 1 and for a target HQ of 0.1. The RSLs for a target HQ of 0.1 were used to select COPCs to avoid omitting chemicals that may contribute to a total HI of greater than 1. For contaminants with both carcinogenic effects and non-cancer effects, the lower of the RSL based on non-cancer HQ of 0.1 and the RSL based on 1E-06 cancer risk was used for COPC screening.

Chemical-Specific Considerations

Data for dioxins and furans were evaluated through use of dioxin toxicity equivalents (TEQs). The toxicity of one specific dioxin compound, 2,3,7,8-tetrachloro-dibenzo-p-dioxin (2,3,7,8-TCDD), has been studied more than other known dioxins and furans. The toxicities of all other dioxins and furans are expressed in relation to 2,3,7,8-TCDD (Van den Berg et al., 2006). The toxicity equivalency factors (TEFs) (presented in Appendix C) were used to convert concentrations of individual dioxin and furan congeners to TEQs of 2,3,7,8-TCDD. Concentrations of individual dioxins and furans were multiplied by their TEFs to yield 2,3,7,8-TCDD equivalent concentrations. One-half the CRQL was used for non-detected congeners in calculating totals. These values were then totaled to yield total dioxin TEQs for each sample. Within applicable tables (e.g., Table 3-1, Appendix A Tables), the 2,3,7,8-TCDD TEQ is referred to as "DIOXIN TEQ MAMMAL HALFND" where the "MAMMAL" component refers to the type of TEF used and "HALFND" refers to the use of one-half the CRQL for non-detected congeners. There were no soil samples for which all dioxin or furan compounds were non-detect. The TEQs were then compared with the screening value for 2,3,7,8-TCDD in the COPC selection step.

PCB data consists of a mixture of Aroclor data, congener data, and homolog data. For soil, both individual Aroclors and the total dioxin TEQ for the dioxin-like PCB congeners were evaluated in the HHRA. Total Aroclors and total PCB homolog data are presented in the soil COPC selection tables for discussion purposes. Aroclor analysis was performed by an onsite, mobile laboratory with a proportion of samples sent to an external laboratory for confirmation analysis. For samples with two sets of Aroclor data (both onsite and external laboratory results) the higher Aroclor result was used for COPC selection. The EPA RSL for high-risk PCBs was used as the screening criterion for Aroclor 1262 and Aroclor 1268. A value of one-half the CRQL was used for non-detected Aroclors or homologs in calculating totals. These values were then summed to yield total Aroclors or total PCB homologs for each sample. For samples with no detected Aroclors or homologs, the total Aroclors or PCB homologs were calculated using one-half of the CRQL.

Dioxin-like PCB congener results were used to evaluate dioxin-like PCBs. Concentrations of individual dioxin-like PCB congeners were multiplied by their TEFs (presented in Appendix C) to yield 2,3,7,8-TCDD equivalent concentrations. A value of one-half the CRQL was used for non-

detected congeners in calculating totals. These values were then totaled to yield total dioxin-like PCB TEQs for each sample. For samples with no detected congeners, the total dioxin-like PCB TEQ was calculated using one-half the CRQL. The dioxin-like PCB TEQs were then compared with the screening value for 2,3,7,8-TCDD in the COPC selection step.

For several contaminants for which EPA has little or no information regarding the chemical's toxicity, screening values from similar chemicals (selected based on similarity of molecular structure) were used as surrogate screening values. The EPA RSL for elemental mercury was used as screening criterion for mercury. The HHRA conservatively screened total chromium results for soil against the EPA RSLs for hexavalent chromium. The EPA RSL for vanadium and compounds was used as the screening criterion for vanadium. A complete list of surrogate chemicals selected for COPC screening and risk characterization are presented in Appendix A, Table A-2.4. Essential nutrients, including calcium, magnesium, potassium, and sodium, were not selected as COPCs. Table 3-1 and Appendix A, Tables A-3.1 through A-3.3 present a summary of COPCs selected for each soil interval.

3.2 Exposure Point Concentrations (EPCs)

Risk assessments are conducted using an EPC for each COPC. The EPC represents an estimated concentration to which a receptor is assumed to be continuously exposed while in contact with an environmental medium. Consistent with EPA's *Supplemental Guidance to RAGS: Calculating the Concentration Term*, (EPA, 1992a) a conservative estimate of the mean concentration is used as the EPC. The EPC is generally defined as the 95 percent upper confidence limit on the mean (UCL) and is calculated using EPA's ProUCL 5.1 software (EPA, 2016).

For data sets with non-detects, non-detect observations are entered into ProUCL as the CRQL value and designated as non-detected observations. ProUCL 5.1 determines the distribution and skewness of the detected data and uses this information to select the appropriate methods [Kaplan-Meier (KM) and regression on order statistics (ROS) methods] to determine surrogate values for non-detects. ProUCL uses these surrogate values instead of employing the simple substitution method (e.g., using one-half the CRQL for non-detects). ProUCL then uses Chebyshev inequality, bootstrap methods, and normal, gamma, and lognormal distribution-based equations on KM (or ROS) estimates to compute the UCL.

ProUCL calculates UCLs using 15 different computation methods, 5 parametric and 10 non-parametric. Parametric methods rely on the estimation of parameters (such as the mean or the standard deviation) describing the distribution of the variable of interest in the population; non-parametric methods do not.

The five parametric UCL computation methods include:

1. Student's-t UCL,
2. Approximate gamma UCL using chi-square approximation,
3. Adjusted gamma UCL (adjusted for level significance),
4. Land's H-UCL, and
5. Chebyshev inequality based UCL (using Minimum Variance Un-biased Estimators (MVUEs) of parameters of a lognormal distribution).

The ten non-parametric methods included in ProUCL are:

1. The central limit theorem (CLT) based UCL,
2. Modified-t statistic (adjusted for skewness) based UCL,
3. Adjusted-CLT (adjusted for skewness) based UCL,
4. Chebyshev inequality based UCL (using sample mean and sample standard deviation),
5. Jackknife method based UCL,
6. UCL based upon standard bootstrap,
7. UCL based upon percentile bootstrap,
8. UCL based upon bias–corrected accelerated (BCA) bootstrap,
9. UCL based upon bootstrap-t, and
10. UCL based upon Hall's bootstrap.

ProUCL provides recommendations on which UCL to use depending upon distributional assumptions and the skewness (as represented by the standard deviation of the data). Distributions are tested for using a number of procedures:

- Graphical test based upon a Q-Q plot.
- Lilliefors test ($\alpha = 0.05$; tests for normality or lognormality for data sets with sample sizes greater than or equal to 50).
- Shapiro-Wilk W test ($\alpha = 0.05$; tests for normality or lognormality for data sets with samples sizes less than 50).
- Anderson Darling test ($\alpha = 0.05$; tests for gamma distribution).
- Kolmogorov-Smirnov test ($\alpha = 0.05$; tests for gamma distribution).

Occasionally, ProUCL recommends two different UCLs. In these instances, the greater of the two is selected as the recommended UCL. For cases where the recommended UCL is greater than the maximum detection, the maximum detection was selected as the EPC. Support documentation

(output from the ProUCL program) for the calculation of the UCLs is presented in Appendix D. EPCs used in the risk assessment are presented in Appendix A, Tables A-3.1 through A-3.3.

4.0 EXPOSURE ASSESSMENT

The exposure assessment defines and evaluates the exposures that may be experienced by a receptor population. To have an exposure, several factors must be present: there must be a source of contamination, there must be a mechanism through which a receptor can come into contact with the contaminants in that medium, and there must actually or potentially be a receptor present at the point of contact.

The exposure assessment presented consists of several sections that characterize the physical setting and the receptors of concern, identify the potential contaminant migration and exposure pathways, and present the equations used to quantify exposure in terms of contaminant intake (dose). Section 4.1 presents the Study Area exposure setting. Section 4.2 presents the conceptual site model. Section 4.3 presents the equations and parameters for estimating chemical intake. Exposure assumptions for each scenario are presented in Appendix A, Tables A-4.1 and A-4.2. Intakes are presented in Appendix A, Tables A-7.1 through A-7.12.

4.1 Exposure Setting

The Site history is described in detail in Section 1.0 of this HHRA.

4.1.1 Local Land and River Use

The land area of the Site is open areas accessible to the public that are not used for any specific purpose. Access to the SEC property is not restricted and the public uses the area for driving recreational all-terrain vehicles. Recreational users may also use areas along Arbuckle Creek, which flows through the New River Gorge National Park and Preserve. No industrial or commercial activities are currently conducted in the areas of concern. As previously identified, there are residential properties located at and near some of the areas of concern, especially along Arbuckle Creek and Rocklick Road. These wetland and adjacent areas are mostly used for passive recreation (such as wildlife viewing and walking along wetland borders) and some active recreation (such as boating activity and water access from ramps, fishing piers).

4.2 Conceptual Site Model for Human Health Risk

This section and Figure 4-1 present the human health Conceptual Site Model (CSM) as it pertains to contaminant exposure and risk to human receptors. A CSM facilitates a consistent and comprehensive evaluation of the risks to human health by creating a framework for identifying the exposure routes or pathways by which human health may be impacted by contaminants

predicted to exist at the source areas. A CSM depicts the relationships between the following elements necessary to construct a complete exposure pathway:

- Sources of contamination and potential COPCs,
- Contaminant release mechanisms and transport pathways,
- Exposure mechanisms and exposure routes, and
- Potentially exposed populations.

The CSM was developed to provide the basis for identifying the potential risks to human health. The model considers the current and future conditions at the Site and the actual or potential receptors that might come into contact with the COPCs and indicates those exposure routes that are carried through the quantitative risk assessment for each receptor. An objective of developing the CSM is to focus attention on those pathways that contribute the most to the potential impacts on human health and to provide the rationale for screening out other exposure pathways that are minor components of the overall risk.

4.2.1 Sources of Contamination and Potential COPCs

The primary source of contamination of the Site is from improper storage of PCB-containing transformers that have leaked into the soil during SEC operations. This oil spillage to the ground surface and surface runoff and infiltration could lead to exposure to contaminants in surface soil, near-surface soil, subsurface soil, and outdoor air through dust and vapor. Though the main contaminants of concern associated with SEC activities are PCBs associated with dielectric oil, volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) may also be associated with other site activities.

4.2.2 Contaminant Release Mechanisms and Transport Pathways

PCBs are chemically and biologically stable, hydrophobic, have high electrical resistivity, have low volatility, and are resistant to heat degradation. PCBs tend to attach to the surface of organic matter and clay and then migrate with these media. Surface releases of PCB oil will migrate laterally through the subsurface soil eventually forming a conic shape of contamination. Contaminants in surface soil could be transported from the source areas to Arbuckle Creek and the surrounding area by storm water run-off, erosion, or flooding. Once deposited in the sediment in Arbuckle Creek, the contaminants could move downstream through water or sediment transport, and ultimately enter the New River. Excavated sediment in the area was used historically along roads in the area for dust suppression; therefore, contaminants could have spread to Rocklick Road and the Berwind Green Hill Mine Dump Area.

4.2.3 Exposure Mechanisms and Exposure Routes

The potential for exposure to the contamination within the Study Area is based on several factors, including current and future land uses, human activity patterns, Site access controls, and chemical behavior in the environment. Based on these variables, exposure scenarios were developed to characterize the potential for current and future human exposure. The future scenario accounts for possible changes in land use and Site characteristics that may alter exposure and/or concentrations of COPCs in a given medium, in addition to the exposures that may result from current uses of the SEC property.

The exposure assessment assumes that, in general, chemical compositions for environmental media are identical under current and future site conditions.

This HHRA defines an exposure route as a generalized description of the behavior that brings a receptor into contact with a contaminated medium. The exposure routes through which receptors at this Study Area may be exposed are:

- incidental ingestion of contaminated surface, near surface, and subsurface soil
- dermal contact with contaminated surface, near surface, and subsurface soil
- inhalation of outdoor air with fugitive dust
- inhalation of outdoor ambient vapor

A summary of the potentially significant exposures identified for quantitative evaluation is provided in Table 2-1 (the same table is also included in Appendix A as Table A-1).

4.2.3.1 Direct Contact with Soil

Receptors may come into direct contact with soil contaminated by the release of chemicals from the source areas. During the receptor's period of contact, the individual may be exposed via inadvertent ingestion of a small amount of soil or via dermal absorption of certain contaminants in the soil.

Because of the limited guidance available to estimate soil exposure via dermal contact, dermal risks can be evaluated quantitatively only for contaminants with available soil absorption factors. Several of these chemicals were selected as COPCs for the Study Area, including dioxins, several PAHs, PCBs, arsenic, and cadmium. Therefore, dermal risks associated with soil for these COPCs were quantitatively addressed in the risk assessment. Dermal contact with other chemicals detected in soil may or may not result in a significant exposure. Various factors affect the rate of dermal absorption, including the amount of soil on the skin surface, soil characteristics (moisture,

pH, organic carbon content, etc.), skin characteristics (thickness, temperature, hydration, etc.), volatilization losses, and chemical-specific properties.

4.2.4 Potentially Exposed Populations

Potentially exposed receptor populations have been identified by analyzing the interaction of current and anticipated future land use practices with the identified sources of contamination. In general, potential current human receptors include trespassers (adolescent) and recreational users (adult/child). Future land use is expected to remain the same as current land use; however, potential future users could also include onsite residents (adult/child), industrial/commercial workers, and construction workers if the properties were to be developed.

Figure 4-1 indicates which exposure routes are considered for each receptor. Table 2-1 presents receptors and exposure pathways identified for the Study Area and provides the rationale for the quantitative evaluation of selected exposure pathways.

4.3 Identification of Exposure Equations and Parameters

To estimate the potential risk to human health that may be posed by the presence of COPCs at the Study Area, it is first necessary to estimate the potential Average Daily Dose (ADD) (i.e., daily intake) of each COPC. The ADD is estimated for each COPC via each exposure pathway by which the receptor is assumed to be exposed. ADD equations combine the estimates of compound concentration in the environmental medium of interest with assumptions regarding the type and magnitude of each receptor's potential exposure to provide a numerical estimate of the exposure dose. The exposure dose is defined as the amount of COPC taken into the receptor and is expressed in units of milligrams of COPC per kilogram of body weight per day (mg/kg-day).

Exposure doses are defined differently for potential carcinogenic and non-carcinogenic effects. The Chronic Average Daily Dose (CADD) (i.e., daily intake) is used to estimate a receptor's potential intake from exposure to a COPC with non-carcinogenic effects. According to EPA guidance (EPA, 1989), the CADD should be calculated by averaging the dose over the period of time for which the receptor is assumed to be exposed. Therefore, the averaging period is the same as the exposure duration. For COPCs with potential carcinogenic effects, however, the Lifetime Average Daily Dose (LADD) (i.e., daily intake) is employed to estimate potential exposures. In accordance with EPA guidance (EPA, 1989), the LADD is calculated by averaging exposure over the receptor's assumed lifetime (70 years). Therefore, the averaging period is the same as the receptor's assumed lifetime. All equations used to estimate potential exposure doses follow EPA guidelines (EPA, 1989) and use the most recent EPA exposure factors (EPA, 2014).

Exposures depend on the predicted concentrations of chemicals in environmental media at the exposure points, and on scenario-specific assumptions and intake parameters based on local land use practices. Both contaminant concentrations and land use are subject to change over time. As mentioned previously, Appendix A, Table A-1 presents a summary of the exposure pathways evaluated in the quantitative risk assessment.

Appendix A presents the *RAGS HHEM Part D* standard format tables documenting the Site HHRA quantitative risk calculations.

Exposure model parameters are described in Section 4.3.1 and 4.3.2 and presented in Appendix A, Tables A-4.1 through A-4.2. The standardized intake equations for estimating a receptor's average daily dose and dermally absorbed dose (both lifetime and chronic) are also presented on the tables. The parameters are used in the intake equations, along with the EPCs presented in Appendix A, Tables A-3.1 through A-3.3, to calculate intakes, which in combinations with toxicity values presented in Appendix A, Tables A-5.1, A-5.2, A-6.1, and A-6.2 are used to estimate risks. Individual chemical intakes for each receptor/exposure route combination are presented in Appendix A, Tables A-7.1 through A-7.12.

This HHRA includes evaluation of RME scenarios. The RME scenarios were developed according to EPA guidance (EPA, 1989) using values that represent the upper distribution or "high-end" of population exposure for exposure parameters. The RME scenario is intended to provide an upper bound of the possible risk. The RME is conceptually the "high end" exposure, above the 90th percentile of the population distribution, but not higher than the individual in the population with the highest exposure.

4.3.1 General Exposure Parameter Assumptions

Several parameters are used in the exposure scenarios and summarized below.

- Body weight (BW) is the same for each adult [80 kilograms (kg)] and child (15 kg), irrespective of scenario.

- Averaging Time (AT) is always the years of the exposure duration (ED) times 365 days per year for CADD and 70 years times 365 days per year for LADD.

- Event Frequency (EV) was set at one per day for all scenarios.

- The fraction of soil intake derived from the contaminated source was set at one.

- Oral absorption factors (OABS) are conservatively assumed to be one for all ingestion routes. In addition, for arsenic, a relative bioavailability factor (RBA) of 0.6 in keeping with that used to develop the EPA RSLs is applied to ingestion of soil pathways. According to the *EPA RSL User's Guide*, "Relative bioavailability accounts for differences in the bioavailability of a contaminant between the medium of exposure (e.g., soil) and the media associated with the toxicity value (e.g., the arsenic RfD and CSF are derived from drinking water studies). The 60% oral RBA for arsenic in soil is empirically-based. It represents an upper-bound estimate from numerous studies where the oral RBA of soil-borne arsenic in samples collected from across the U.S. was experimentally determined against the water-soluble form." (EPA, 2021b).

- Chemical-specific dermal absorption factors (ABS), presented in *RAGS HHEM, Part E, Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004), were used to estimate exposure doses for soil exposures. The ABS values that are available for the COPCs are presented in Appendix E, Table E-1.

4.3.2 Scenario-specific Exposure Parameter Assumptions

The following subsections present scenario-specific exposure assumptions.

4.3.2.1 Current and Future Recreators, Exposure to Soil

Recreational visitors, potentially exposed to soil via incidental ingestion, dermal contact, and inhalation of fugitive dust and ambient vapor were evaluated for exposures to surface soil. For the RME evaluation, the exposure frequency assumptions for adult and child recreational visitors' exposure to soil were 52 days per year, assuming one Site visit for each week of the year. Adult and child recreators were assumed to ingest an average of 100 milligram per day (mg/day) and 200 mg/day of soil, respectively. The calculated available skin surface areas for dermal contact with soil and the soil-to-skin adherence factor (AF) were set to the residential default values (Table A-4.1).

4.3.2.2 Current and Future Trespasser, Exposure to Soil

Adolescent trespassers, potentially exposed to soil via incidental ingestion, dermal contact, and inhalation of fugitive dust and ambient vapor were quantitatively evaluated in this HHRA for exposures to surface soil. The exposure frequency assumptions for an adolescent trespassers exposure to soil were 16 days per year. Adolescent trespassers (age 6-16 years) were assumed to ingest an average of 50 mg/day of soil for 10 years (Tables A-4.1 and A-4.2). Surface area estimates for each body part were extracted from EPA (2011). The adult AF of 0.07 milligrams per square centimeter per event (mg/cm^2-event) corresponds to the geometric mean for resident gardeners.

This value is more conservative than the activity specific weighted adherence factors for children playing in dry soil (EPA 2004). The calculated available skin surface areas for dermal contact with soil for adolescents were 4,890 square centimeters (cm^2). This value assumes that the head, hands, forearms, and lower legs are exposed.

4.3.2.3 Future Resident, Exposure to Soil

Future adult and child residents, potentially exposed to soil via incidental ingestion, dermal contact with soil, and inhalation of fugitive dust and ambient vapors were evaluated in this HHRA for exposure to surface, near surface, and subsurface soil. Exposure to surface soil (0-0.5 ft bgs) and total soil (0-8.8 ft bgs) were separately evaluated to assess risk from exposure to soils most likely to be contacted (i.e., surface soil). Appendix A, Tables A-4.1 and A-4.2 present the exposure parameters for adult and child resident exposures to soil.

The exposure frequency assumptions for adult and child resident exposure to soil were 350 days per year. Adult residents were assumed to ingest an average of 100 mg/day of soil for 20 years. Child residents were assumed to ingest an average of 200 mg/day of soil for 6 years. The adult AF of 0.07 mg/cm^2-event corresponds to the geometric mean for resident gardeners. A value of 0.2 mg/cm^2-event was used as the soil adherence factor for child exposures. The child recreational soil adherence factor of 0.2 mg/cm^2-event corresponds to the recommended child value for RME scenario (EPA, 2004). Skin surface areas for dermal contact were set to residential default values (6,032 cm^2 and 2,373 cm^2) for the adult and child residents, respectively.

4.3.2.4 Future Industrial Worker, Exposure to Soil

Future Industrial Workers, potentially exposed to soil via incidental ingestion, dermal contact, and inhalation of fugitive dust and ambient vapor for exposure to surface and near surface soil. Appendix A, Tables A-4.1 and A-4.2 present the exposure parameters for future industrial worker exposures to soil.

The exposure frequency assumption for industrial workers exposure to soil was 250 days per year. Industrial workers were assumed to ingest an average of 100 mg/day of soil for 25 years. The adult AF of 0.12 mg/cm^2-event corresponds to the arithmetic mean of weighted average of body part-specific mean adherence factors for adult commercial/industrial activities (EPA, 2011). The calculated available skin surface areas for dermal contact with soil for industrial workers was 3,527 cm^2.

4.3.2.5 Future Construction Worker, Exposure to Soil

Future Construction Workers, potentially exposed to soil via incidental ingestion, dermal contact, and inhalation of fugitive dust and ambient vapor for exposure to surface, near surface, and

subsurface soil. Appendix A, Tables A-4.1 and A-4.2 present the exposure parameters for construction worker exposures to soil.

The exposure frequency assumption for a construction worker was set to 250 days per year. Constructions workers were assumed to ingest an average of 330 mg/day of soil for 1 year of construction. An AF of 0.3 mg/cm^2-event, corresponding to the 95th percentile value for construction workers, was applied in the dermal exposure model (EPA, 2004). The calculated available skin surface areas for dermal contact with soil for construction workers was set to 3,527 cm^2.

4.3.3 Intake Equations

The standardized intake equations for estimating a receptor's average daily dose, dermally absorbed dose, and average daily concentrations (lifetime, chronic, and subchronic) are presented below.

Incidental Ingestion of Soil

This pathway was evaluated for all receptors exposed to soil. In general, intakes associated with soil ingestion were calculated using the following equation from *RAGS HHEM, Part A* (EPA, 1989):

Average Daily Dose (Daily Intake) following ingestion of soil (mg/kg-day):

$$ADD = \frac{CS \times IR \times OABS \times FI - S \times EF \times ED \times CF}{BW \times AT}$$

where:

ADD	=	Average daily dose of contaminant from soil (mg/kg-day)
CS	=	Exposure concentration for soil (mg/kg)
IR	=	Ingestion rate (mg/day)
OABS	=	Oral absorption factor
FI-S	=	Fraction ingested from contaminated source (decimal fraction)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (year)
CF	=	Conversion factor (10^{-6} kg/mg)
BW	=	Body weight (kg)
AT	=	Averaging time (days); for non-carcinogens, AT=ED*365 days/year; for carcinogens, AT=70 years*365 days/year

Dermal Contact with Soil

This pathway was evaluated for all receptors exposed to soil. The following equations from *RAGS HHEM, Part E, Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004) were used to estimate the average daily dose (lifetime and chronic) and the dermally absorbed dose (DAD) for soil:

Average Daily Dose (Daily Intake) following dermal contact with soil (mg/kg-day):

$$ADD = DAD$$

where:

ADD = Average daily dose (mg/kg-day)
DAD = Dermally absorbed dose (mg/kg-day)

Dermally Absorbed Dose following dermal contact with soil (mg/kg-day):

$$DAD = \frac{DA_{event} \times EF \times ED \times EV \times SA}{\text{BW} \times \text{AT}}$$

where:

DAD = Dermally absorbed dose (mg/kg-day)
DA_{event} = Absorbed dose per event (mg/cm^2-event))
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
EV = Event frequency (events/day)
SA = Surface area (cm^2)
BW = Body weight (kg)
AT = Averaging time (days);
for non-carcinogens, AT=ED*365 days/year;
for carcinogens, AT=70 yr*365 days/year

The calculation of the dose absorbed per unit area per event (DA_{event}) is as follows:

$$DA_{event} = CS \times AF \times ABS \times CF$$

where:

DA_{event} = Absorbed dose per event (mg/cm^2-event)
CS = Exposure concentration for soil (mg/kg)
AF = Soil-to-skin adherence factor (mg/cm^2-event)
ABS = Dermal absorption fraction (unitless)
CF = Conversion factor (10^{-6} kg/mg)

Exposure to Fugitive dust in Ambient Air

Based on the available data, a mathematical model was required for the inhalation pathway to convert the chemical concentration in soil to a corresponding concentration in ambient air. This was accomplished by calculating a soil-to-air particulate emission factor (PEF). The PEF converts concentrations of constituents in soil to concentrations on dust particles in the air (PM_{10}) as a result of fugitive dust emissions from bare surfaces of fine-grained soils. Particulate emissions from soil-impacted sites are due to wind erosion; therefore, depend on the erodibility of the soil.

In its *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, the EPA (2002a) recommends that the fugitive dust inhalation pathway be focused on semi-volatile compounds and metals (VOCs are not anticipated to adhere to air-borne soil particles and are addressed separately). Also in this guidance document, the EPA provides the methodology required to calculate the PEF. Separate equations were used to estimate PEFs for the construction worker and for the residents, recreators, trespasser, and industrial worker. Chemical-specific concentrations in soil are multiplied by the inverse of the PEF to derive chemical-specific concentrations of soil dust in the ambient air (C_a), as follows:

$$C_a\ (mg/m^3) = C_s \times \left(\frac{1}{PEF}\right)$$

where:

C_s = Concentration in soil (mg/kg); and
PEF = Particulate emission factor (m^3/kg).

Construction workers may inhale wind-borne dust particles during a variety of construction activities. The EPA considers the majority of dust emissions during construction to be liberated from truck traffic on unpaved roads. Consequently, the PEF is based on fugitive dusts that may be generated as a result of construction traffic. Site-specific values, such as total time over which construction occurs (T) and surface area of contaminated road surface (A_R) were incorporated into the construction worker PEF. Data from climate zone VII (Huntington, West Virginia) were used in determining the air dispersion constants. Appendix F provides the site-specific PEF calculation for the construction scenario.

Residents, recreators, trespassers, and industrial workers may be exposed to residual chemicals in soil via inhalation of chemicals entrained with dust particles due to wind erosion. Inhalation exposures to dust-entrained chemicals for the residents, recreators, trespassers, and industrial workers were estimated using the West Virginia default PEF of 1.36×10^9 m^3/kg.

The soil-to-air volatilization factor (VF) is used to define the relationship between the concentration of the contaminant in soil and the flux of the volatilized contaminant to air. VF is calculated using chemical-specific properties and default values for soil moisture, dry bulk density, and fraction of organic carbon in soil. The derivation of chemical-specific VFs for the soil-to-outdoor air exposure pathway is presented in Appendix F.

5.0 TOXICITY ASSESSMENT

The toxicity assessment for the COPCs examines information concerning the potential human health effects of exposure to COPCs. The goal of the toxicity assessment is to provide, for each COPC, a quantitative estimate of the relationship between the magnitude and type of exposure and the severity or probability of human health effects. The toxicity values presented in this section are integrated with the exposure assessment (Section 4.0) to characterize the potential for the occurrence of adverse health effects (Section 6.0).

The toxicological evaluation involves a critical review and interpretation of toxicity data from epidemiological, clinical, animal, and in vitro studies. This review of the data ideally determines both the nature of the health effects associated with a particular chemical and the probability that a given quantity of a chemical could result in the referenced effect. This analysis defines the relationship between the dose received and the incidence of an adverse effect for the COPCs.

For cancer effects, the toxicity values are expressed as Cancer Slope Factors (CSFs) in units of per milligrams of COPC per kilogram per day $(mg/kg\text{-}day)^{-1}$ or as Inhalation Unit Risk factors (IUR) in units of per micrograms of COPC per cubic meter $(\mu g/m^3)^{-1}$. For non-cancer effects, the toxicity values are expressed as RfD in units of mg/kg-day and Reference Concentrations (RfCs) in units of milligrams per cubic meter (mg/m^3). The entire toxicological database is used to guide the derivation of these toxicity values. These data may include epidemiological studies, long-term animal bioassays, short-term tests, and evaluations of molecular structure. Data from these sources are reviewed to determine if a chemical is likely to be toxic to humans. Because of the lack of available human studies, however, the majority of the toxicity data used to derive CSFs, IURs, RfDs, and RFCs comes from animal studies.

The EPA's Integrated Risk Information System (IRIS) database (EPA, 2022) was consulted as the primary source for RfDs, RfCs, CSFs, and IURs. EPA intends that IRIS supersedes all other sources of toxicity information for risk assessment. Additional sources for the dose-response values used in the risk assessment were the EPA National Center for Environmental Assessment (NCEA) in Cincinnati, Ohio, and the Health Effects Assessment Summary Tables (HEAST) (EPA, 1997). The following Office of Solid Waste and Emergency Response (OSWER) hierarchy was used for selection for toxicity values (EPA, 2003):

- Tier 1 – EPA's IRIS;

- Tier 2 – EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) – The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC) develops PPRTVs on a chemical specific basis when requested by EPA's Superfund program; and

- Tier 3 – Other toxicity values – Tier 3 includes additional EPA and non-EPA sources of toxicity information.

The EPA RSLs Table (EPA, 2021a) provides a source of NCEA values. Appendix A, Tables A-5.1 and A-6.1 present oral non-carcinogenic and carcinogenic toxicity values, respectively. Appendix A, Tables A-5.2 and A-6.2 present inhalation non-carcinogenic and carcinogenic toxicity values, respectively. For several COPCs without toxicity values, the toxicity values of similar contaminants were used as surrogates (Appendix A, Table A-2.4).

Toxicity profiles summarizing the available literature on carcinogenic and non-carcinogenic effects associated with human exposure to specific chemicals are available from EPA or the Agency for Toxic Substances and Disease Registry (ATSDR) at www.epa.gov/iris or www.atsdr.cdc.gov.

5.1 Non-Carcinogenic Effects

For non-carcinogenic effects, it is assumed that there exists a dose, below which, adverse health effects are unlikely to be seen. To derive an RfD, EPA reviews all relevant human and animal studies for each compound and selects the study (studies) pertinent to the derivation of the specific RfD. For non-carcinogenic effects, the most appropriate animal model (the species most biologically similar to the human) is identified. Pharmacokinetic data often enter into this determination. In the absence of sufficient data to identify the most appropriate animal model, the most sensitive species is chosen. The RfD is generally derived from the most comprehensive toxicology study that characterizes the dose-response relationship for the critical effect of the chemical. Preference is given to studies using the exposure route of concern; in the absence of such data, however, an RfD for one route of exposure may be extrapolated from data from a study that evaluated a different route of exposure. Such extrapolation must consider pharmacokinetic and toxicological differences between the routes of exposure.

Uncertainty factors are applied to account for extrapolation of data from laboratory animals to humans (interspecies extrapolation), variation in human sensitivity to the toxic effects of a compound (intraspecies differences), derivation of a chronic RfD based on a subchronic rather

than a chronic study, or derivation of an RfD from the lowest-observed-adverse-effect-level (LOAEL) rather than the no-observed-adverse-effect-level (NOAEL). In addition to these uncertainty factors, modifying factors between 1 and 10 may be applied to reflect additional qualitative considerations in evaluating the data. For most compounds, the modifying factor is one.

Dermal toxicity factors are based on route-to-route extrapolation (oral to dermal) for systemic effects as described in EPA *RAGS HHEM, Part E, Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004). To derive the dermal RfD, the oral RfD (based on an administered dose) is multiplied by the gastrointestinal tract absorption efficiency factor to determine an RfD based on an absorbed dose rather than an administered dose. The resulting dermal RfD is used to evaluate the dermal (absorbed) dose calculated by the dermal exposure algorithms.

Oral RfDs and inhalation RfCs for the COPCs for the Study Area are presented in Appendix A, Tables A-5.1 and A-5.2, respectively. Dermal RfDs and the absorption efficiencies used in their determination are also included in Appendix A, Table A-5.1. The absorption efficiencies were obtained from EPA's Table 4.1, "Summary of Gastrointestinal Absorption Efficiencies and Recommendations for Adjustment of Oral Slope Factors for Specific Compounds" in *RAGS HHEM, Part E, Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004). The tables also include the primary target organs affected by each listed chemical, where information is available. This information was used in the risk characterization (Section 6.0) to segregate risks by target organ effects when the total HI is greater than 1. Chronic RfDs used in this assessment are developed to be protective of long-term exposure. Subchronic RfDs were used, where available, to evaluate construction worker non-cancer hazards.

Chemical-Specific Considerations

The toxicity and non-cancer risk characterization for dioxins were evaluated through use of dioxin TEQs in conjunction with the RfD for 2,3,7,8-TCDD of 7.0×10^{-10} mg/kg-day in determining non-cancer risk.

The HHRA assumes all total chromium detections in soil are solely representative of hexavalent chromium. Therefore, the toxicity and non-cancer risk characterization for the total chromium results in soil incorporated the use of the hexavalent chromium RfD.

5.2 Carcinogenic Effects

The toxicity information considered in the assessment of potential carcinogenic risks includes chemical-specific CSFs and a weight-of-evidence narrative consistent with *Guidelines for Carcinogenic Risk Assessment* (EPA, 2005a). These revised guidelines use standard narrative

descriptors (Carcinogenic to Humans, Likely to Be Carcinogenic to Humans, Suggestive Evidence of Carcinogenic Potential, Inadequate Information to Assess Carcinogenic Potential, and Not Likely to Be Carcinogenic to Humans) to describe the likelihood that a chemical is a human carcinogen and are based on an evaluation of the available data from human and animal studies.

The CSFs are plausible upper bound estimates of carcinogenic potency used to calculate cancer risk from exposure to carcinogens, by relating estimates of lifetime average chemical intake to the incremental probability of an individual developing cancer over a lifetime.

CSFs are derived from studies of carcinogenicity in humans and/or laboratory animals. For animal studies, preference is given to studies using the route of exposure of concern, in which normal physiologic function was not impaired, and in which exposure occurred during most of the animal's lifetime. Exposure and pharmacokinetic considerations are used to estimate equivalent human doses for computation of the CSF. CSFs are specific to a chemical and route of exposure and are expressed in units of $(mg/kg\text{-}day)^{-1}$ for oral routes.

In the absence of dermal toxicity values, route-to-route extrapolation is applied to CSFs in evaluation of systemic cancer effects as a result of dermally absorbed contaminants.

Oral CSFs and inhalation IURs for COPCs at the Study Area are presented in Appendix A, Tables A-6.1 and A-6.2, respectively. Dermal CSFs and the absorption efficiencies used in their determination are also included in Appendix A, Table A-6.1. The absorption efficiencies were obtained from EPA's Table 4.1, "Summary of Gastrointestinal Absorption Efficiencies and Recommendations for Adjustment of Oral Slope Factors for Specific Compounds" in *RAGS HHEM, Part E, Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004).

EPA's *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposures to Carcinogens* (EPA, 2005b) was followed when assessing carcinogens that act with a mutagenic mode of action. EPA's Age-Dependent Adjustment Factors (ADAFs) were used to assess the increased susceptibility of children to carcinogens. Further discussion is provided in Section 6.1.2.

Chemical-Specific Considerations

Carcinogenic risks from PAHs were evaluated following EPA's provisional guidance to assess PAHs (EPA, 1993). EPA has determined that the oral CSF for benzo(a)pyrene is 1.0 $(mg/kg\ day)^{-1}$. CSFs for other carcinogenic PAHs are determined by multiplying the CSF for benzo(a)pyrene by the estimated order of potential potency (rather than a TEF) for the PAH. Estimated orders of potential potency (rather than a toxicity equivalency factor or TEF) were developed based on skin painting tests and are rounded to one significant figure (based on an order of magnitude). The

values are based on a comparable endpoint (complete carcinogenesis after repeated exposure to mouse skin). The quality of the data do not support any greater precision. The orders of potential potency used in this HHRA are represented in the toxicity values for individual compounds. These oral CSFs for PAHs became the basis for deriving the dermal CSFs used to evaluate dermal risk from PAHs.

The toxicity and cancer risk characterizations for dioxins and furans and dioxin-like PCB congeners were evaluated through use of dioxin TEQs in conjunction with the CSF for 2,3,7,8-TCDD of $1.3x10^{+5}$ $(mg/kg\text{-}day)^{-1}$ (EPA, 2021a) in determining cancer risk.

The toxicity and cancer risk characterization for the portion of total chromium were evaluated through use of hexavalent chromium CSFs. Trivalent chromium is not considered carcinogenic. EPA's Office of Pesticide Programs (OPP) decided that hexavalent chromium has a mutagenic mode of action for carcinogenesis in all cells regardless of type, following administration via drinking water. OPP recommended ADAFs be applied when assessing cancer risks from early-life exposure (< 16 years of age). This determination was reviewed by OPP's Cancer Assessment Review Committee and published in a peer review journal. A discussion of all Site COPCs with mutagenic mode of action is provided in Section 6.1.2.

6.0 RISK CHARACTERIZATION

This section provides a characterization of the potential human health risks associated with the potential exposure to COPCs in various media within the Study Area. Section 6.1 outlines the methods used to estimate the type and magnitude of health risks and Section 6.2 presents the risk characterization results for the current and potential future land use conditions.

6.1 Risk Characterization Methodology

Potential human health risks resulting from exposure to COPCs were estimated using algorithms established by EPA. The methods are protective of human health and are likely to overestimate (rather than underestimate) risk. The methodology uses specific algorithms to calculate risk as a function of chemical concentration, human exposure parameters, and toxicity.

Risks from hazardous chemicals are calculated for either carcinogenic or non-carcinogenic effects. Some carcinogenic chemicals may also exhibit non-carcinogenic effects, in which case, potential impacts are characterized for both types of health effects.

6.1.1 Non-Cancer Effects

The hazards associated with non-cancer effects of COPCs are evaluated by comparing an ADD to an RfD. The ratio of the ADD to an RfD is called the hazard quotient (HQ) and is defined as follows (EPA, 1989):

$$HQ = \frac{\text{ADD}}{\text{RfD}}$$

where:

HQ = Hazard Quotient (unitless)
ADD = Average daily dose (mg/kg-day), a function of exposure and chemical concentration
RfD = Reference dose (mg/kg-day)

The HQ for the inhalation pathway was calculated as follows:

$$HQ = \frac{\text{CA}}{\text{RfC}}$$

where:

CA = Air concentration ($\mu g/m^3$)
RfC = Reference concentration ($\mu g/m^3$)

If the ratio of the ADD to the RfD or the CA to the RfC exceeds 1, there exists a potential for non-carcinogenic (toxic) effects to occur. A HI is generated by summing the individual HQs for all COPCs. If the value of the HI exceeds 1, there is a potential for non-carcinogenic health effects associated with that particular chemical mixture; therefore, it is necessary to segregate the HQs by target organ effects. The HQ should not be construed as a probability, but rather as a numerical indicator of the extent to which a predicted intake exceeds or is less than an RfD.

6.1.2 Carcinogens

Risks attributable to exposure to chemical carcinogens are estimated as the probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The ILCR is determined as follows (EPA, 1989):

$$ILCR = ADD \times CSF$$

where:

ILCR = Incremental lifetime cancer risk, expressed as a unitless probability
ADD = Average daily dose (mg/kg-day)

CSF = Cancer slope factor $(mg/kg\text{-}day)^{-1}$

Potential ILCRs from inhalation exposure were calculated by multiplying the calculated air concentration and the IUR as follows:

$$ILCR = CA \times IUR$$

where:

CA = Air concentration ($\mu g/m^3$)
IUR = Inhalation Unit Risk ($\mu g/m^3$)

Risks below 1E-06 (less than 1 in 1 million) are generally considered to be acceptable by EPA, and risks greater than 1E-04 (1 in 10,000) are generally considered to be unacceptable. Risks between 1E-06 and 1E-04 are generally considered to be within EPA's targeted cancer risk range.

Risks are estimated for all carcinogenic COPCs with available CSFs, regardless of the narrative descriptors described in Section 5.2.

Carcinogens That Act with a Mutagenic Mode of Action

For carcinogens that act with a mutagenic mode of action for carcinogenesis, ADAFs were applied to the cancer slope factor to address early lifetime exposures and the increased susceptibility of children to carcinogens (EPA, 2005b). As presented in the RSL Table (EPA, 2021a), the following COPCs exhibit a mutagenic mode of action for carcinogenesis:

Benzo(a)anthracene	Dibenz(a,h)anthracene
Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene
Benzo(b)fluoranthene	Hexavalent Chromium

The ADAFs for specific age-groups classes are presented below:

Age (years)	**ADAF (unitless)**
0 – <2	10
2 – <16	3
≥16	1

Potential risk to the child residents and child recreators was assessed using the information presented below.

Age (years)	Exposure Factors	Exposure Duration (years)	ADAF (unitless)
0 – <2	Child	2	10
2 – <6	Child	4	3

$$\text{Total Risk for child exposures} = \text{Risk}_{0-<2} + \text{Risk}_{2-<6}$$

For the adolescent trespasser (ages 6-16), the total risk is derived using an ADAF equal to 3. These risks are included in the Appendix A RAGS D tables.

6.2 Risk Characterization Results

A summary of the quantitative risk assessment is provided in this section.

Table 6-1 summarizes the RME non-cancer and cancer results, identifies major contributors to RME cancer risks greater than 1E-06 or hazard indices greater than 1. Non-carcinogenic risks are evaluated separately for adult and child recreational visitors and the hypothetical resident. Cancer risks for recreational visitors and the hypothetical resident are evaluated for lifetime (age-adjusted) exposures.

Details of the risk estimates are presented in Appendix A, as follows:

- Appendix A, Tables A-7.1 through A-7.12, present non-cancer and cancer risk estimates for each receptor.

- Appendix A, Tables A-9.1 through A-9.12 present summaries of cancer risks and health hazard indices from all applicable media and pathways for each exposure scenario.

- Tables labeled with a "b" (e.g., Table A-7.4b) represent the risk characterization when the maximum detected concentration of Aroclor 1260 is used as the EPC for surface soil with near-surface soil, and total soil. These tables are used to characterize the health risks of exposure to a Aroclor 1260 hotspot.

- There was only a single exceedance of a 1E-04 total cancer risk, the results are documented on Table A-10.1. No target-organ hazard indices were greater than one.

The following sections discuss results by exposure interval in soil, including hazard indices and cancer risks.

6.2.1 Surface Soil (0 to 0.5 feet)

Potential receptors include current/future adult and child recreational visitors, current/future adolescent trespassers, and future hypothetical adult and child residents exposed to surface soil from 0 to 0.5 ft bgs. Only RME scenarios were evaluated. Cancer risk and hazard indices developed for the above-mentioned receptors are as follows:

Receptor (**Timeframe**)	**Cancer Risk**	**HI**
Child recreational visitor (current/future)	--	0.4
Adult recreational visitor (current/future)	--	0.05
Lifetime recreational visitor (current/future)	2E-05	--
Adolescent trespasser (current/future)	6E-07	0.01
Child hypothetical resident (**future**)	--	**3**
Adult hypothetical resident (future)	--	0.3
Lifetime hypothetical resident (future)	1E-04	--

There were no exceedances of the acceptable range of total cancer risks (1E-04) and the only target-organ hazard index greater than one was the HI for endocrine effects for the child hypothetical resident. The unsegregated HI for the child resident (3) is the result of the summation of estimated hazards across multiple systemic endpoints. When the hazards are segregated by target organ only the HI for endocrine effects exceeded unity (Appendix A, Table A-9.2). The on-site resident child exposed to surface soil (0-0.5 feet) exceeded the HI of 1 for endocrine effects and PCBC TEQ, dioxin, and cobalt contributed to this unacceptable risk.

6.2.2 Near Surface and Total Soil (0 to 2 feet and 0 to 8.8 feet)

Potential receptors include future industrial workers exposed to surface and near surface soil (0 to 2 ft bgs), future construction workers exposed to total soil (0 to 8.8 ft bgs), and future hypothetical adult and child residents (0 to 8.8 ft bgs) exposed to total soil. Only RME scenarios were evaluated.

Cancer risk and hazard indices developed for the above-mentioned receptors are as follows:

Receptor (**Timeframe**)	**Cancer Risk** [1]		**HI**
Adult industrial worker (future)	2E-05	*4E-05*	0.3
Adult construction worker (future)	2E-06	*5E-06*	0.6
Child hypothetical resident (**future**)	--	--	**3**
Adult hypothetical resident (future)	--	--	0.3

Receptor (Timeframe)	Cancer Risk[1]		HI
Lifetime hypothetical resident (future)	1E-04	***2E-04***	--

Notes:

[1] The second *italicized* number represents the cumulative cancer risk using the maximum detected concentration of Aroclor 1260 (i.e., a "hotspot" evaluation).

There were no exceedances of the acceptable range of target-organ hazard indices greater than one for any of the receptors identified above. The unsegregated HI for the child resident (3) is the result of the summation of estimated hazards across multiple systemic endpoints. When the hazards are segregated by target organ, none exceed unity, indicating the results are below the hazard threshold (Appendix A, Table A-9.5a and A-9.5b). The only exceedance of the acceptable range of carcinogenic effects occurred for the lifetime hypothetical resident when evaluating the Aroclor 1260 hotspot. Upon removal of the "hotspot" location, these estimated cancer risks and HIs indicate potential adverse non-cancer effects are not expected for any receptor exposed to near-surface or total soil from 0 to 2 ft bgs or 0 to 8.8 ft bgs, respectively.

7.0 UNCERTAINTY ANALYSIS

There are uncertainties and variability associated with all HHRAs. This section summarizes these uncertainties and provides a qualitative assessment of whether the uncertainties may over or underestimate risks. Although there are various sources of uncertainty throughout the risk assessments, assumptions were made to provide conservative estimates that are protective of public health such that the risk estimates are unlikely to underestimate potential risks. The approach to using data is conservative and this conservatism is likely to overestimate risk.

Once the risk calculations are complete, the results must be viewed considering the uncertainties inherent in the process. An understanding of the risk assessment and associated uncertainties provides the risk manager with additional information for consideration in the risk management decision.

Consistent with EPA guidance and policy (EPA, 1992b and 1995) exposure and toxicity assumptions from the "high end" of the distributions were used. The RME is conceptually the "high end" exposure above the 90th percentile of the population distribution but not higher than the individual in the population with the highest exposure. The CTE reflects the central (average) estimates of exposure. Presentation of only the RME scenario results in a risk estimate that is overestimated for the majority the exposed population.

Uncertainties within individual components of the HHRA for the Study Area are discussed below.

7.1 Uncertainty in Data Evaluation

Selection of the data to be used in the HHRA can introduce uncertainty. This HHRA has selected the most current data available and representative of potential exposure areas which may have been impacted by the former SEC property activities.

Conservative screening values were used to select COPCs and contaminants; thus, it is unlikely that any contaminant that may pose a risk was eliminated from the risk assessment during the data evaluation step. Though metal analytes, PAHs, and dioxins and furans may have an anthropogenic source, the contribution of background risk to total risk was not considered in the HHRA, likely resulting in an overestimation or risk.

There were a few chemicals detected for which screening values were not available because little or no information is available regarding the chemical's toxicity. For these chemicals, if possible, surrogate screening values selected based on similarity of molecular structure were used qualitatively for screening. The use of surrogate chemicals for screening may result in the over-estimation or underestimation of risk. The following chemicals did not have screening levels or surrogate chemicals: 4-bromophenyl-phenylether, 4-chlorophenyl-phenylether, acenaphthylene, benzo(g,h,i)perylene, carbazole, dimethylphthalate, and phenanthrene. Their exclusion from the risk characterization, may result in an underestimation of risk.

The HHRA conservatively screened total chromium results for soil against the EPA RSLs for hexavalent chromium. The use of hexavalent chromium toxicity values is likely to result in an over-estimation of carcinogenic risk. The EPA RSLs for individual Aroclors were used as screening criteria for Aroclors 1016 through 1260. The EPA RSL for high-risk PCBs was used as the screening criterion for Aroclors 1262 and 1268. A value of ½ the CRQL was used for non-detected Aroclors or homologs in calculating totals. These values were then totaled to yield total Aroclors or total PCB homologs for each sample. The use of ½ the CRQL may result in the overestimation or underestimation of risk.

The impact of screening using surrogate values resulted in the following:

- Chemicals not detected in any soil interval;
    - 1,3-Dichlorobenzene, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 2-nitrophenol, 3-nitroaniline, 4-nitrophenol, Aroclor 1262, Aroclor 1268

- Chemicals eliminated as COPCs in all soil intervals; and

    - m,p-Xylene, methylcyclohexane, 3 & 4 methylphenol, delta-BHC, Endosulfan I, Endosulfan II, Endrin aldehyde, Endrin ketone, mercury

- Chemicals selected as COPCs (same for all intervals).
    - PCB congener TEQ mammal, dioxin TEQ mammal, chromium

There are many chemicals that are not part of EPA's list of routine analytes. Therefore, additional chemicals could be present that were not detected in the laboratory analysis that could increase potential risk.

A COPC was selected if the maximum detected concentration in soil exceeded its respective risk-based screening criterion or WVDEP "De Minimis" screening level. Frequency of detection was not used to eliminate COPCs. Even if the compound was detected at a very low frequency, i.e., less than 5% across the entire Study Area, the compound was still retained for evaluation in the risk assessment if the maximum detected concentration within a dataset exceeded the screening criterion. Retention of infrequently detected contaminants (i.e., 1,2,4,5-tetrachlorobenzene) as COPCs results in an increased risk. Because other contaminants contribute greater risk levels, the impacts to total risk of including these infrequently detected contaminants in the risk calculations are minor.

PCB data for soil consists of a mixture of Aroclor data, congener data, and homolog data. This HHRA used individual Aroclor data for evaluations of soil PCB risks. For field duplicate samples and Aroclor results with both mobile and fixed-based laboratory results, the higher result was selected for use the in the risk assessment. This conservative approach may result in an overestimation of risk.

PCB congener data results were used to evaluate dioxin-like PCBs. Concentrations of individual dioxin-like PCB congeners were multiplied by their TEFs (presented in Appendix C) to yield 2,3,7,8-TCDD equivalent concentrations. A value of ½ the CRQL was used for non-detected dioxin-like congeners in calculating totals. These values were then totaled to yield total dioxin-like PCB TEQs for each sample. This approach may result in an overestimation or underestimate of risk if dioxin-like PCB congeners are present above or below ½ the CRQL.

The overall approach to the data analysis and use of data is conservative and this conservatism is likely to overestimate risk.

7.2 Uncertainty in the Exposure Assessment

Uncertainty in the exposure assessment arises from the selection of receptors and selection of exposure parameters. Each is discussed below.

7.2.1 Exposure Scenarios and Receptor Identification

Exposure scenarios were selected to represent a range of current and future potential uses. The scenarios are conservative and likely to overestimate risk to individuals whose exposure is more limited.

7.2.2 Selection of Exposure Parameters

Each exposure factor selected for use in this risk assessment has some associated uncertainty. Ingestion and dermal absorption of soil are the most important routes of exposure for the potential Site uses. Estimates of soil ingestion rates for both children and adults are based on a limited number of studies and were generally conducted for residential exposures. This limitation may result in an over or underestimate of potential risks.

Bioavailability of some COPCs to target tissues may be reduced due to their binding capacities and the presence of other naturally occurring compounds. Carcinogenic PAHs, for example, are often present in association with high molecular weight constituents that hinder their uptake (LaGoy and Quirk, 1994).

7.3 Uncertainty in the Toxicological Evaluation

The toxicity values used in the quantitative assessment were those available in EPA databases. The overall approach to the determination of toxicity values is conservative and this conservatism is likely to overestimate risk, with the exceptions described in the following sections.

7.3.1 Carcinogenic Toxicity Values

CSFs are plausible upper-bound estimates of carcinogenic potency used to calculate cancer risk from exposure to carcinogens by relating estimates of lifetime average chemical intake to the incremental probability of an individual developing cancer over a lifetime as a result of exposure to Study Area contaminants. Because the CSFs are upper-bound estimates, EPA is reasonably confident that the actual cancer risks are unlikely to be underestimated.

CSFs were not available for all chemicals. The lack of a CSF may underestimate risk.

7.3.2 Chronic Reference Doses (RfDs)

The RfD represent estimates (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime. An uncertainty factor may be applied for interspecies and intrahuman variability, for extrapolation from subchronic to chronic exposures, or for epidemiological data limitations. Application of uncertainty factors to the RfD is expected to overestimate risks.

The absence of toxicity values for some of the COPCs may tend to underestimate risks and hazards. For example, oral RfDs were not available for most PAHs. The lack of a RfD may underestimate risk.

7.3.3 Synergistic and Antagonistic Effects

During the toxicity assessment, the interaction of multiple chemicals via synergistic and antagonistic effects was not explicitly evaluated. Synergistic effects between chemicals could result in a greater combined effect that is not quantified during the risk characterization (i.e., underestimate of risk). However, antagonistic effects were not evaluated during the toxicity assessment as well. Not accounting for antagonistic effects would result in an overestimate of potential risk.

7.4 Uncertainty Associated with Risk Characterization

The conservative assumptions applied in conducting this risk assessment result in estimates that likely overestimate risk and EPA is confident do not underestimate the potential risks.

Cancer risks are added to estimate the total incremental risk as a result of exposure to chemicals. Summing cancer risks may overestimate total risks. The lack of information on synergistic effects of multiple contaminants may underestimate risks and the lack of information on antagonistic effects may overestimate risks.

8.0 SUMMARY OF HUMAN HEALTH RISK ASSESSMENT

This section and Table 6-1 present a summary of the quantitative risk assessment findings for the HHRA Study Area.

Summaries for individual receptors and exposure intervals are discussed below:

- Surface Soil (0 to 0.5 ft bgs);
    - Lifetime cancer risk and non-cancer hazard indices did not exceed target thresholds and adverse effects are unlikely for the receptors listed below.
        - Current/future recreational visitor (child, adult, lifetime)
        - Current/future trespasser (adolescent)
        - Future hypothetical resident (adult, lifetime)
    - The HI for endocrine effects exceeded 1 for the future hypothetical child resident and PCBC TEQ, dioxin, and cobalt contributed to the unacceptable risk. See Table A-10.1 in RAGS tables.

- Total Soil (0 to 2 ft bgs); and
    - Lifetime cancer risk and non-cancer hazard indices did not exceed target thresholds and adverse effects are unlikely for the receptors listed below.
        - Future industrial worker (adult)

- Total Soil (0 to 8.8 ft bgs)
    - Lifetime cancer risk for the future hypothetical resident (lifetime) exceeded the target threshold of 1E-04 when evaluating the potential Aroclor 1260 hotspot.
        - COCs include benzo[a]pyrene, Aroclor-1260, dioxin/furans, dioxin-like PCBs, arsenic, and chromium in soil. See Table A-10.2 in RAGS tables.
    - All other lifetime cancer risk and non-cancer hazard indices did not exceed target thresholds and adverse effects are unlikely for the receptors listed below.
        - Future construction worker (adult)
        - Future hypothetical resident (child, adult, lifetime [non-hotspot])

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TABLES

Table 2-1
Selection of Exposure Pathways
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population [2]	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil (0 - 0.5 ft bgs)	Surface Soil	Surface Soil	Trespasser	Adolescent (6-16)	Ingestion Dermal Absorption	Quantification	Receptor could ingest/contact surface soil while trespassing on the site.
				Recreator	Child			Receptor could ingest/contact surface soil while recreating at the site.
					Adult			
					Child/Adult			The cancer risk estimates for the adult recreator (20 years) and child recreator (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult recreator.
		Air	Outdoor Ambient Air Above Surface Soil (Vapors and Particulates)	Trespasser	Adolescent (6-16)	Inhalation	Quantification	Receptor could inhale particulates from ambient air above the surface soil.
				Recreator	Child			Receptor could inhale particulates from ambient air above the surface soil.
					Adult			
					Child/Adult			The cancer risk estimates for the adult recreator (20 years) and child recreator (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult recreator.
			Upward Migration of Vapors from Surface Soil (Indoors)	Trespasser	Adolescent (10-16)		None	Receptor is assumed to spend his/her time mostly outdoors. Receptor is not likely to inhale vapors/particulates from indoor air in any significant quantities.
				Recreator	Child			Receptor is assumed to spend most of his/her time outdoors.
					Adult			
					Child/Adult			
Future	Surface Soil (0 - 0.5 ft bgs)	Surface Soil	Surface Soil	Hypothetical Resident	Child	Ingestion Dermal Absorption	Quantification	Receptor could ingest/contact surface soil while living on site.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor could ingest/contact surface soil from the site during construction activities.
				Industrial Worker				Receptor could ingest/contact surface soil from the site while conducting routine maintenance activities (i.e., mowing lawns).
		Air	Outdoor Ambient Air Above Surface Soil (Vapors and Particulates)	Hypothetical Resident	Child	Inhalation	Quantification	Receptor could inhale vapors/particulates from ambient air above the surface soil while living on site.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor could inhale vapors/particulates from ambient air above the surface soil.
				Industrial Worker				Receptor could inhale vapors/particulates from ambient air above the surface soil.
			Upward Migration of Vapors from Soil (Indoors)	Hypothetical Resident	Child		None	Receptor could inhale VOCs from soil via vapor intrusion into residence. USEPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor is assumed to spend most of his/her time outdoors.
				Industrial Worker				Receptor could inhale VOCs from soil via vapor intrusion into building while working indoors. USEPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway.

Table 2-1
Selection of Exposure Pathways
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population [2]	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Subsurface Soil (0.5 - 2 ft bgs; 0.5 - 8.8 ft bgs)[1]	Subsurface Soil	Subsurface Soil	Hypothetical Resident	Child	Ingestion Dermal Absorption	Quantification	Receptor could ingest/contact subsurface soil when mixed with surface soil from construction of a residence.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to subsurface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor could ingest/contact subsurface soil from the site while during construction activities.
				Industrial Worker				Receptor could ingest/contact subsurface soil when mixed with surface soil following land redevelopment activities.
		Air	Outdoor Ambient Air Above Subsurface Soil (Vapors and Particulates)	Hypothetical Resident	Child	Inhalation	Quantification	Receptor could inhale vapors/particulates from ambient air above the subsurface soil when mixed with surface soil from construction of a residence.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to subsurface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor could inhale vapors/particulates from ambient air above the subsurface soil during construction activities.
				Industrial Worker				Receptor could inhale vapors/particulates from ambient air above the subsurface when mixed with surface soil following land redevelopment activities.
			Upward Migration of Vapors from Soil (Indoors)	Hypothetical Resident	Adult		None	Receptor could inhale VOCs from soil via vapor intrusion into residence. USEPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway.
					Child			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to subsurface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor is assumed to spend most of his/her time outdoors.
				Industrial Worker				Receptor could inhale VOCs from soil via vapor intrusion into building while working indoors. USEPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway.

Notes:
ft bgs = feet below ground surface

(1) Industrial worker exposed to 0.5 - 2 ft bgs only; all other future receptors exposed to full 0.5 - 8.8 ft bgs interval.
USEPA (2015). Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. OSWER Publication 9200.2-154. June.

Table 3-1
Chemicals of Potential Concern (COPCs) Summary
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Chemical	CASRN	Surface Soil (0 - 0.5 ft bgs)	Near Surface Soil (0.5 - 2 ft bgs)	Subsurface Soil (2 - 8.8 ft bgs)
Semi-Volatile Organic Compounds (SVOCs)				
1,2,4,5-Tetrachlorobenzene	95-94-3	○	--	●
Benzo(a)anthracene	56-55-3	--	●	●
Benzo(a)pyrene	50-32-8	●	●	●
Benzo(b)fluoranthene	205-99-2	--	●	●
Dibenz(a,h)anthracene	53-70-3	○	○	●
Indeno(1,2,3-cd)pyrene	193-39-5	--	●	●
Pesticides				
Dieldrin	60-57-1	--	--	●
Polychlorinated Biphenyls (PCBs)				
Aroclor 1254	11097-69-1	--	●	●
Aroclor 1260	11096-82-5	●	●	●
PCBs - Congeners (PCBCs)				
PCBC TEQ MAMMAL HALFND	CALC029P	●	●	●
Dioxins and Furans				
DIOXIN TEQ MAMMAL HALFND	CALC029D	●	●	●
Metals				
Aluminum	7429-90-5	●	●	●
Antimony	7440-36-0	○	●	○
Arsenic	7440-38-2	●	●	●
Cadmium	7440-43-9	--	●	●
Chromium	7440-47-3	●	●	●
Cobalt	7440-48-4	●	●	●
Iron	7439-89-6	●	●	●
Manganese	7439-96-5	●	●	●
Thallium	7440-28-0	●	●	●

Notes:
○ open circle indicates non-detect but CRQL greater than screening level - chemical not selected as a COPC and discussed within the uncertainty text;
● closed circle indicates COPC; -- indicates not selected as a COPC
CASRN = Chemical Abstracts Service Registry Number
ft bgs = feet below ground surface
HALFND = non-detects censored at half the contract required quatitation limit (CRQL)
TEQ = Toxicity Equivalence

Table 6-1
Summary of Cancer Risks and Non-Cancer Hazard Indices
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Chemical	CASRN	Current/Future Exposure					Future Exposure									
		Surface Soil (0 - 0.5 ft bgs)					Surface Soil (0 - 0.5 ft bgs)			Total Soil (0 - 2 ft bgs)[1]		Total Soil (0 - 8.8 ft bgs)[1]				
		Recreator			Trespasser		Hypothetical Resident			Industrial Worker		Hypothetical Resident			Construction Worker	
		CR_L	HQ_A	HQ_C	CR	HQ	CR_L	HQ_A	HQ_C	CR	HQ	CR_L	HQ_A	HQ_C	CR	HQ
Semi-Volatile Organic Compounds (SVOCs)																
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	56-55-3	--	--	--	--	--	--	--	--	--	--	--	0.0007	0.006	--	0.02
Benzo(a)pyrene	50-32-8	--	--	--	--	--	--	--	--	2E-08	--	4E-07	--	--	3E-09	--
Benzo(b)fluoranthene	205-99-2	1E-07	0.0001	0.0009	4E-09	0.00003	1E-06	0.0007	0.006	1E-07	0.001	3E-06	0.002	0.02	2E-08	0.01
Dibenz(a,h)anthracene	53-70-3	--	--	--	--	--	--	--	--	3E-08	--	6E-07	--	--	4E-09	--
Indeno(1,2,3-cd)pyrene	193-39-5	--	--	--	--	--	--	--	--	--	--	1E-07	--	--	9E-10	--
Pesticides																
Dieldrin	60-57-1	--	--	--	--	--	--	--	--	--	--	1E-07	0.0001	0.001	3E-09	0.0003
Polychlorinated Biphenyls (PCBs)																
Aroclor 1254	11097-69-1	--	--	--	--	--	--	--	--	6E-07	0.04	3E-07	0.006	0.05	9E-09	0.008
Aroclor 1260[1]	11096-82-5	1E-06	--	--	5E-08	--	7E-06	--	--	2E-06 *3E-05*	--	5E-06 *1E-04*	--	--	2E-07 *3E-06*	--
PCBs - Congeners (PCBCs)																
PCBC TEQ MAMMAL HALFND	CALC029P	9E-07	0.008	0.08	3E-08	0.002	6E-06	0.06	0.6	1E-06	0.03	5E-06	0.04	0.4	1E-07	0.004
Dioxins and Furans																
DIOXIN TEQ MAMMAL HALFND	CALC029D	6E-07	0.006	0.06	2E-08	0.002	4E-06	0.04	0.4	6E-07	0.02	2E-06	0.02	0.2	7E-08	0.002
Metals																
Aluminum	7429-90-5	--	0.002	0.02	--	0.0004	--	0.01	0.1	--	0.008	--	0.01	0.1	--	0.08
Antimony	7440-36-0	--	--	--	--	--	--	--	--	--	0.003	--	0.004	0.03	--	0.008
Arsenic	7440-38-2	2E-06	0.004	0.04	7E-08	0.001	1E-05	0.03	0.2	4E-06	0.03	2E-05	0.04	0.3	5E-07	0.03
Cadmium	7440-43-9	--	--	--	--	--	--	--	--	6E-11	0.0005	2E-10	0.0005	0.005	3E-10	0.002
Chromium	7440-47-3	1E-05	0.002	0.02	5E-07	0.0007	8E-05	0.01	0.1	7E-06	0.01	1E-04	0.02	0.1	1E-06	0.02
Cobalt	7440-48-4	6E-10	0.007	0.07	7E-11	0.002	3E-08	0.05	0.5	6E-09	0.03	2E-08	0.04	0.5	4E-08	0.03
Iron	7439-89-6	--	0.007	0.07	--	0.002	--	0.04	0.5	--	0.03	--	0.04	0.4	--	0.09
Manganese	7439-96-5	--	0.007	0.06	--	0.003	--	0.06	0.4	--	0.04	--	0.05	0.4	--	0.3
Thallium	7440-28-0	--	0.003	0.03	--	0.0007	--	0.02	0.2	--	0.01	--	0.02	0.2	--	0.01
	Total[2,3,4]	**2E-05**	**0.05**	**0.4**	**6E-07**	**0.01**	**1E-04**	**0.3**	**3**	**2E-05** ***4E-05***	**0.3**	**1E-04** ***2E-04***	**0.3**	**3**	**2E-06** ***5E-06***	**0.6**

Notes:

(1) For Total Soil exposure (0-2 and 0-8.8 ft bgs), the first number represents the carcinogenic risk for Aroclor 1260 using an Upper Confidence Limit and the second *italicized number* represents the carcinogenic risk using the maximum detection or "hotspot".

(2) Cancer risk (CR) and hazard quotients (HQs) are rounded to one non-zero digit (USEPA, 1989); cumulative totals may be slightly higher or lower depending on degree of rounding.

(3) Cumulative target-organ hazard quotients (HQs) only exceeded the acceptable target threshold of 1 for endocrine effects in surface soil (0-0.5 ft bgs) for the child, hypothetical resident.

(4) Red indicates an exceedance of a cumulative, acceptable target threshold.

-- = Not Evaluated

CASRN = Chemical Abstracts Service Registry Number

CR_L = Cancer risk for lifetime exposure

HQ_A = Hazard quotient for adult

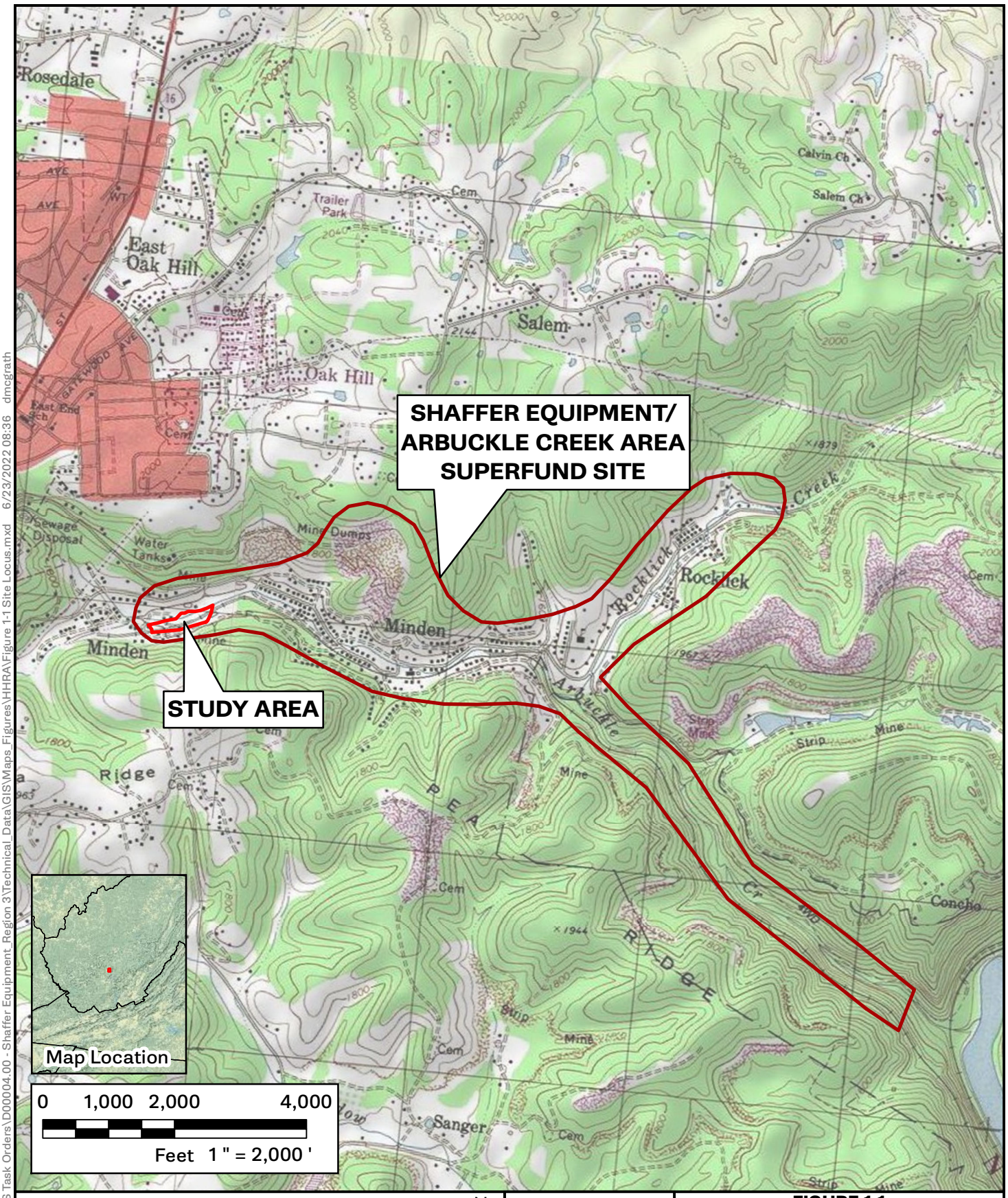
HQ_C = Hazard quotient for child

ft bgs = feet below ground surface

HALFND = non-detects censored at half the contract required quatitation limit (CRQL)

TEQ = Toxicity Equivalence

FIGURES



F:\DES - D0000.00\DES Task Orders\D00004.00 - Shaffer Equipment_Region 3\Technical_Data\GIS\Maps_Figures\HHRA\Figure 1-1 Site Locus.mxd 6/23/2022 08:36 dmcgrath

USGS Topographic Map
Minden, Fayette County, WV
Revised 1984

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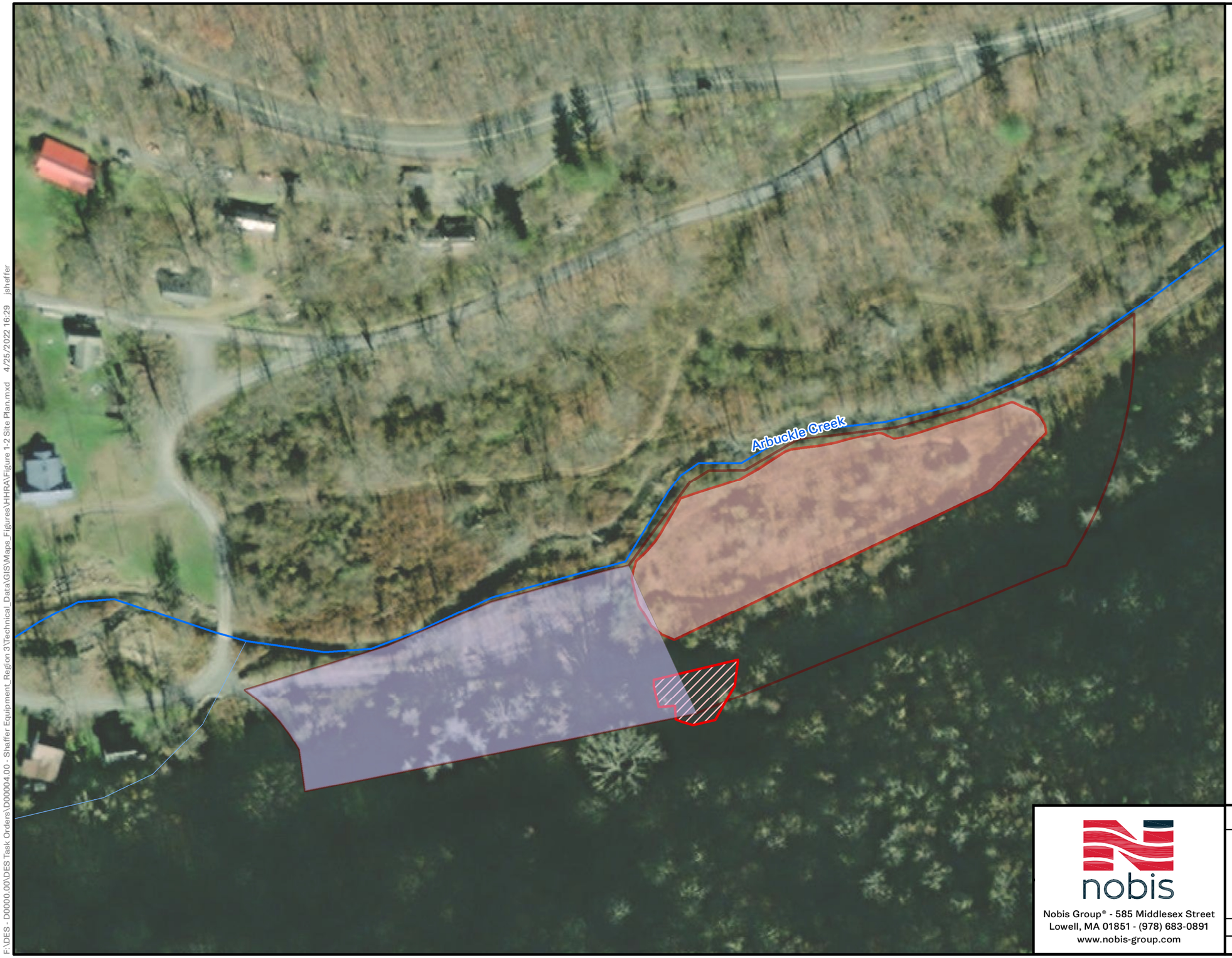
FIGURE 1-1

SITE LOCATION
SEC PROPERTY HHRA
SHAFFER EQUIPMENT/
ARBUCKLE CREEK AREA SUPERFUND SITE
MINDEN, FAYETTE COUNTY, WV

PREPARED BY: JTS	CHECKED BY: MSL
PROJECT NO. D00004.004	DATE: JUNE 2022



Notes:

1. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

2. Aerial imagery provided by ESRI.

Legend

- Area of Past Soil Removal
- Area of 2019 EPA Soil Removal
- Area of Cap
- Former SEC Property
- Arbuckle Creek
- Unnamed Tributary

0 50 100 200 Feet

1 inch = 100 feet

N

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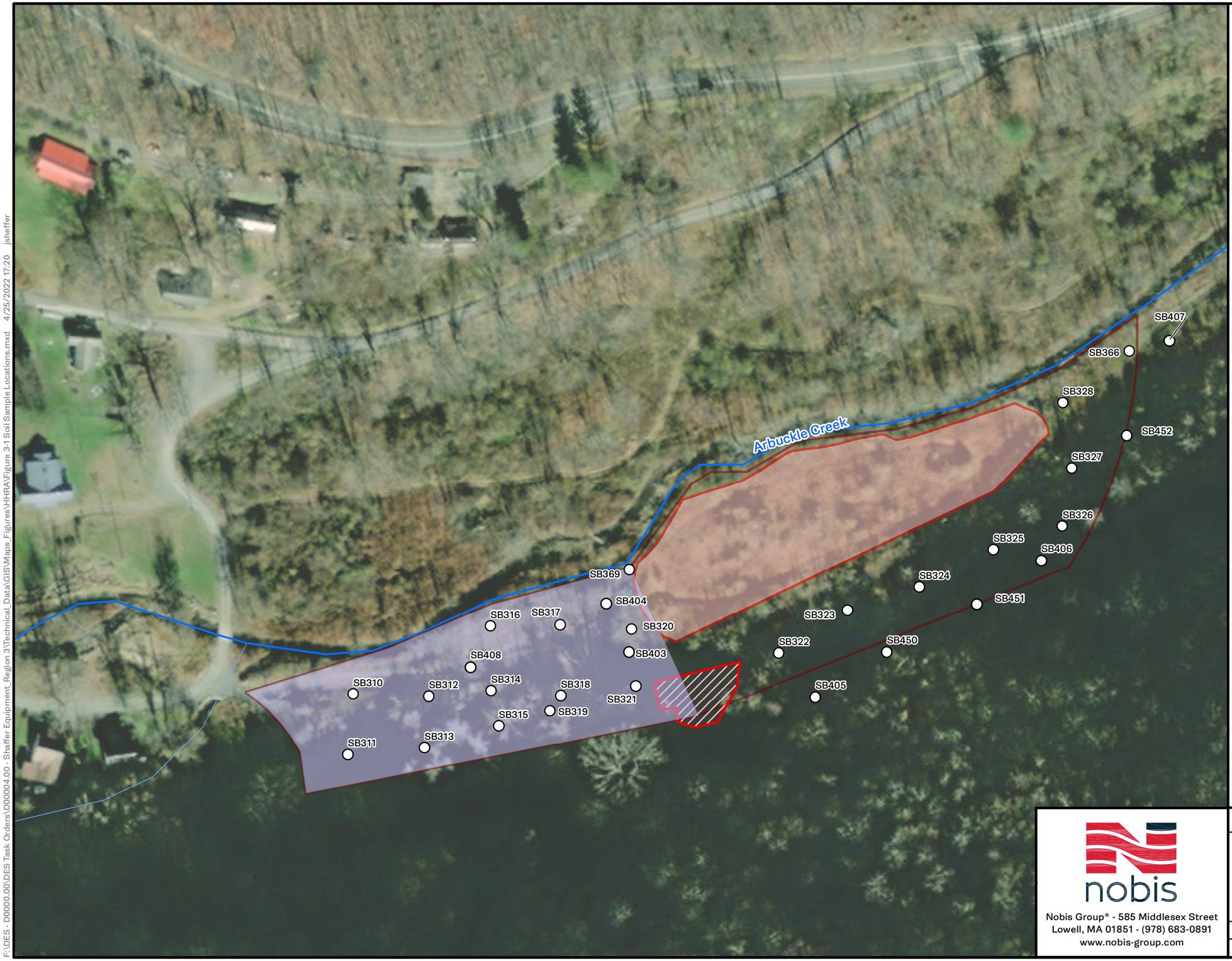
FIGURE 1-2

SITE PLAN
SEC PROPERTY HHRA
SHAFFER EQUIPMENT/ARBUCKLE CREEK
AREA SUPERFUND SITE
MINDEN, FAYETTE COUNTY, WV

PREPARED BY: JTS	CHECKED BY: MSL
PROJECT NO. D00004.004	DATE: APRIL 2022



Notes:

1. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

2. Aerial imagery provided by ESRI.

Legend

- Remedial Investigation Soil Sample Locations
- Area of Past Soil Removal
- Area of 2019 EPA Soil Removal
- Area of Cap
- Former SEC Property
- Arbuckle Creek
- Unnamed Tributary

0 50 100 200 Feet

N

1 inch = 100 feet

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FIGURE 3-1

SOIL SAMPLE LOCATIONS
SEC PROPERTY HHRA
SHAFFER EQUIPMENT/ARBUCKLE CREEK
AREA SUPERFUND SITE
MINDEN, FAYETTE COUNTY, WV

PREPARED BY: JTS	CHECKED BY: MSL
PROJECT NO. D00004.004	DATE: APRIL 2022

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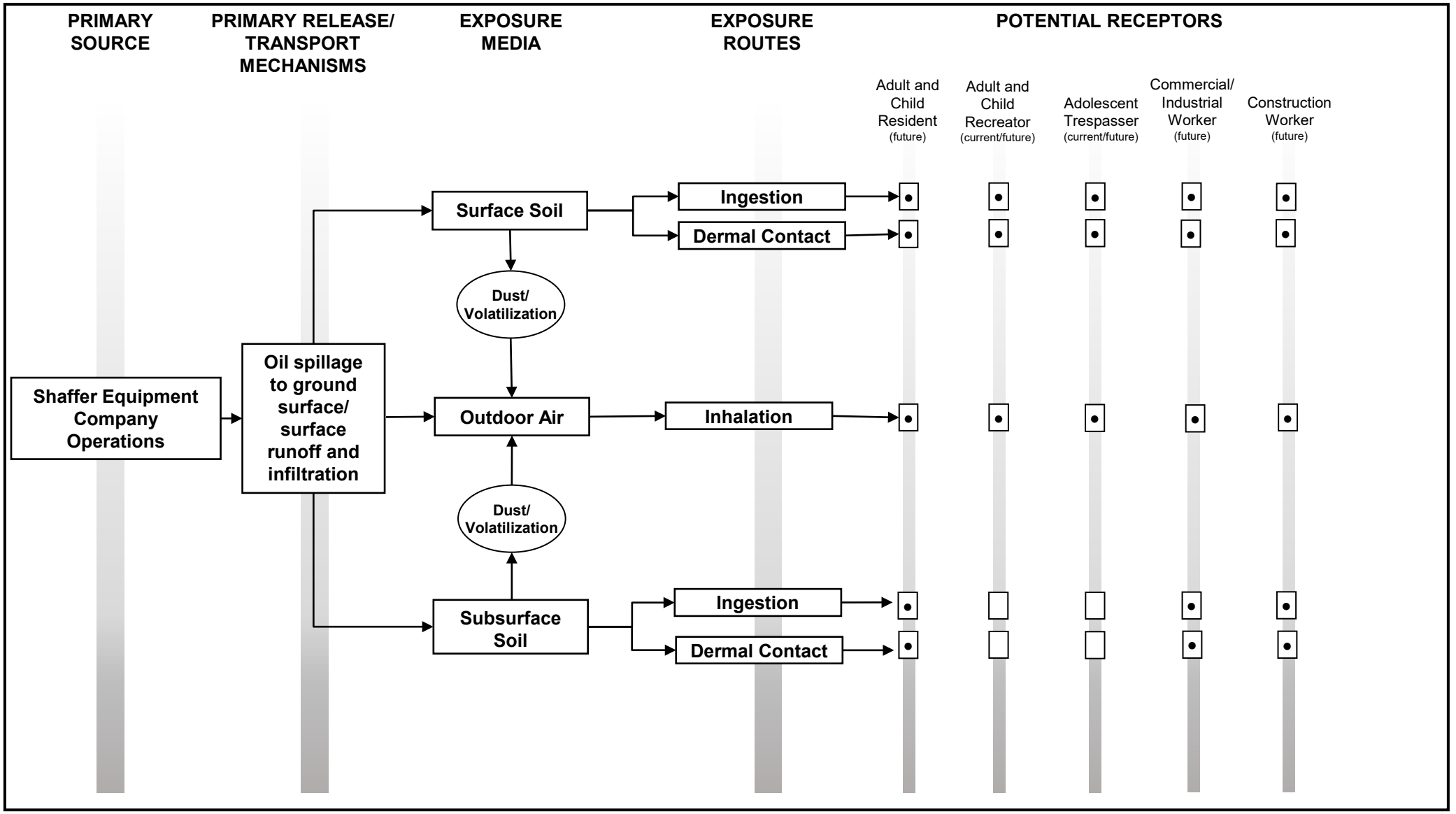

LEGEND:

● = complete exposure pathway for quantification in the risk assessment.

□ = incomplete exposure pathway.

FIGURE 4-1
Conceptual Site Model – Human Exposures

Shaffer Equipment/Arbuckle Creek Area Superfund Site

APPENDICES

APPENDIX A

Table A-1
Selection of Exposure Pathways
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population [2]	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil (0 - 0.5 ft bgs)	Surface Soil	Surface Soil	Trespasser	Adolescent (6-16)	Ingestion Dermal Absorption	Quantification	Receptor could ingest/contact surface soil while trespassing on the site.
				Recreator	Child			Receptor could ingest/contact surface soil while recreating at the site.
					Adult			
					Child/Adult			The cancer risk estimates for the adult recreator (20 years) and child recreator (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult recreator.
		Air	Outdoor Ambient Air Above Surface Soil (Vapors and Particulates)	Trespasser	Adolescent (6-16)	Inhalation	Quantification	Receptor could inhale particulates from ambient air above the surface soil.
				Recreator	Child			Receptor could inhale particulates from ambient air above the surface soil.
					Adult			
					Child/Adult			The cancer risk estimates for the adult recreator (20 years) and child recreator (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult recreator.
			Upward Migration of Vapors from Surface Soil (Indoors)	Trespasser	Adolescent (10-16)		None	Receptor is assumed to spend his/her time mostly outdoors. Receptor is not likely to inhale vapors/particulates from indoor air in any significant quantities.
				Recreator	Child			Receptor is assumed to spend most of his/her time outdoors.
					Adult			
					Child/Adult			
Future	Surface Soil (0 - 0.5 ft bgs)	Surface Soil	Surface Soil	Hypothetical Resident	Child	Ingestion Dermal Absorption	Quantification	Receptor could ingest/contact surface soil while living on site.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor could ingest/contact surface soil from the site during construction activities.
				Industrial Worker				Receptor could ingest/contact surface soil from the site while conducting routine maintenance activities (i.e., mowing lawns).
		Air	Outdoor Ambient Air Above Surface Soil (Vapors and Particulates)	Hypothetical Resident	Child	Inhalation	Quantification	Receptor could inhale vapors/particulates from ambient air above the surface soil while living on site.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor could inhale vapors/particulates from ambient air above the surface soil.
				Industrial Worker				Receptor could inhale vapors/particulates from ambient air above the surface soil.
			Upward Migration of Vapors from Soil (Indoors)	Hypothetical Resident	Child		None	Receptor could inhale VOCs from soil via vapor intrusion into residence. USEPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor is assumed to spend most of his/her time outdoors.
				Industrial Worker				Receptor could inhale VOCs from soil via vapor intrusion into building while working indoors. USEPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway.

Table A-1
Selection of Exposure Pathways
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population [2]	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Subsurface Soil (0.5 - 2 ft bgs; 0.5 - 8.8 ft bgs)[1]	Subsurface Soil	Subsurface Soil	Hypothetical Resident	Child	Ingestion Dermal Absorption	Quantification	Receptor could ingest/contact subsurface soil when mixed with surface soil from construction of a residence.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to subsurface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor could ingest/contact subsurface soil from the site while during construction activities.
				Industrial Worker				Receptor could ingest/contact subsurface soil when mixed with surface soil following land redevelopment activities.
		Air	Outdoor Ambient Air Above Subsurface Soil (Vapors and Particulates)	Hypothetical Resident	Child	Inhalation	Quantification	Receptor could inhale vapors/particulates from ambient air above the subsurface soil when mixed with surface soil from construction of a residence.
					Adult			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to subsurface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor could inhale vapors/particulates from ambient air above the subsurface soil during construction activities.
				Industrial Worker				Receptor could inhale vapors/particulates from ambient air above the subsurface when mixed with surface soil following land redevelopment activities.
			Upward Migration of Vapors from Soil (Indoors)	Hypothetical Resident	Adult		None	Receptor could inhale VOCs from soil via vapor intrusion into residence. USEPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway.
					Child			
					Child/Adult			The cancer risk estimates for the adult resident (20 years) and child resident (6 years) are added together (26 years) to address lifetime exposure to subsurface soil. The non-cancer hazard evaluations are treated separately for child and adult resident.
				Construction Worker	Adult			Receptor is assumed to spend most of his/her time outdoors.
				Industrial Worker				Receptor could inhale VOCs from soil via vapor intrusion into building while working indoors. USEPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway.

Notes:
ft bgs = feet below ground surface

(1) Industrial worker exposed to 0.5 - 2 ft bgs only; all other future receptors exposed to full 0.5 - 8.8 ft bgs interval.
USEPA (2015). Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. OSWER Publication 9200.2-154. June.

Table A-2.1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0 – 0.5 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
Volatile Organic Compounds (VOCs)																					
1,1,1-Trichloroethane	71-55-6	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	810		RSL	640	WVDEP	No	100% ND and CRQL ≤ SL
1,1,2,2-Tetrachloroethane	79-34-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.6		RSL	0.64	WVDEP	No	100% ND and CRQL ≤ SL
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	670		RSL	910	WVDEP	No	100% ND and CRQL ≤ SL
1,1,2-Trichloroethane	79-00-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.15		RSL	1.2	WVDEP	See Uncertainty	100% ND and CRQL > SL
1,1-Dichloroethane	75-34-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	3.6		RSL	3.8	WVDEP	No	100% ND and CRQL ≤ SL
1,1-Dichloroethene	75-35-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	23		RSL	240	WVDEP	No	100% ND and CRQL ≤ SL
1,2,3-Trichlorobenzene	87-61-6	N/A		N/A		mg/kg	N/A	N/A	0/19	0%	0.0042 – 0.43	0.43	CRQL	N/A	6.3		RSL	N/A	--	No	100% ND and CRQL ≤ SL
1,2,4-Trichlorobenzene	120-82-1	N/A		N/A		mg/kg	N/A	N/A	0/19	0%	0.0042 – 0.43	0.43	CRQL	N/A	5.8		RSL	24	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dibromo-3-chloropropane	96-12-8	N/A		N/A		mg/kg	N/A	N/A	0/19	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.0053		RSL	0.0057	WVDEP	See Uncertainty	100% ND and CRQL > SL
1,2-Dibromoethane	106-93-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.036		RSL	0.039	WVDEP	See Uncertainty	100% ND and CRQL > SL
1,2-Dichlorobenzene	95-50-1	N/A		N/A		mg/kg	N/A	N/A	0/19	0%	0.0042 – 0.43	0.43	CRQL	N/A	180		RSL	380	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dichloroethane	107-06-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.46		RSL	0.5	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dichloropropane	78-87-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	1.6		RSL	2.7	WVDEP	No	100% ND and CRQL ≤ SL
1,3-Dichlorobenzene	541-73-1	N/A		N/A		mg/kg	N/A	N/A	0/19	0%	0.0042 – 0.43	0.43	CRQL	N/A	180	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
1,4-Dichlorobenzene	106-46-7	N/A		N/A		mg/kg	N/A	N/A	0/19	0%	0.0042 – 0.43	0.43	CRQL	N/A	2.6		RSL	2.8	WVDEP	No	100% ND and CRQL ≤ SL
2-Butanone	78-93-3	0.018		0.018		mg/kg	SA-SB314 (11/7/2019)	0 - 0.5	1/21	5%	0.0085 – 0.85	0.018	MDC	N/A	2700		RSL	28000	WVDEP	No	CRQL and MDC ≤ SL
2-Hexanone	591-78-6	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0085 – 0.85	0.85	CRQL	N/A	20		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Methyl-2-pentanone	108-10-1	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0085 – 0.85	0.85	CRQL	N/A	3300		RSL	3400	WVDEP	No	100% ND and CRQL ≤ SL
Acetone	67-64-1	0.0091	J	0.15		mg/kg	SA-SB314 (11/7/2019)	0 - 0.5	7/21	33%	0.0085 – 0.85	0.15	MDC	N/A	7000		RSL	61000	WVDEP	No	CRQL and MDC ≤ SL
Benzene	71-43-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	1.2		RSL	1.2	WVDEP	No	100% ND and CRQL ≤ SL
Bromochloromethane	74-97-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	15		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Bromodichloromethane	75-27-4	N/A		N/A		mg/kg	N/A	N/A	0/15	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.29		RSL	0.31	WVDEP	See Uncertainty	100% ND and CRQL > SL
Bromoform	75-25-2	N/A		N/A		mg/kg	N/A	N/A	0/19	0%	0.0042 – 0.43	0.43	CRQL	N/A	19		RSL	20	WVDEP	No	100% ND and CRQL ≤ SL
Bromomethane	74-83-9	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.68		RSL	7.3	WVDEP	No	100% ND and CRQL ≤ SL
Carbon disulfide	75-15-0	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	77		RSL	740	WVDEP	No	100% ND and CRQL ≤ SL
Carbon tetrachloride	56-23-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.65		RSL	0.7	WVDEP	No	100% ND and CRQL ≤ SL
Chlorobenzene	108-90-7	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	28		RSL	290	WVDEP	No	100% ND and CRQL ≤ SL
Chloroethane	75-00-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	540		RSL	2100	WVDEP	No	100% ND and CRQL ≤ SL
Chloroform	67-66-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.32		RSL	0.34	WVDEP	See Uncertainty	100% ND and CRQL > SL
Chloromethane	74-87-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	11		RSL	120	WVDEP	No	100% ND and CRQL ≤ SL
cis-1,2-Dichloroethene	156-59-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	16		RSL	17	WVDEP	No	100% ND and CRQL ≤ SL
cis-1,3-Dichloropropene	10061-01-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	1.8	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Cyclohexane	110-82-7	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	650		RSL	120	WVDEP	No	100% ND and CRQL ≤ SL
Dibromochloromethane	124-48-1	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	8.3		RSL	8.3	WVDEP	No	100% ND and CRQL ≤ SL
Dichlorodifluoromethane	75-71-8	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	8.7		RSL	94	WVDEP	No	100% ND and CRQL ≤ SL
Ethylbenzene	100-41-4	0.49		0.49		mg/kg	SA-SB310 (11/7/2019)	0 - 0.5	1/21	5%	0.0042 – 0.0079	0.49	MDC	N/A	5.8		RSL	6.2	WVDEP	No	CRQL and MDC ≤ SL
Isopropylbenzene	98-82-8	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	190		RSL	270	WVDEP	No	100% ND and CRQL ≤ SL
m,p-Xylene	179601-23-1	2.5		2.5		mg/kg	SA-SB310 (11/7/2019)	0 - 0.5	1/21	5%	0.0042 – 0.0079	2.5	MDC	N/A	58	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Methyl acetate	79-20-9	0.0069	J-	0.56		mg/kg	SA-SB310 (11/7/2019)	0 - 0.5	3/21	14%	0.0042 – 0.0069	0.56	MDC	N/A	7800		RSL	23000	WVDEP	No	CRQL and MDC ≤ SL
Methyl tert-butyl ether	1634-04-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	47		RSL	50	WVDEP	No	100% ND and CRQL ≤ SL
Methylcyclohexane	108-87-2	0.00096	J	0.004	J	mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	4/21	19%	0.0042 – 0.43	0.004	MDC	N/A	650	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Methylene chloride	75-09-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	35		RSL	58	WVDEP	No	100% ND and CRQL ≤ SL
o-Xylene	95-47-6	0.83		0.83		mg/kg	SA-SB310 (11/7/2019)	0 - 0.5	1/21	5%	0.0042 – 0.0079	0.83	MDC	N/A	64		RSL	N/A	--	No	CRQL and MDC ≤ SL
Styrene	100-42-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	600		RSL	870	WVDEP	No	100% ND and CRQL ≤ SL
Tetrachloroethene	127-18-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	8.1		RSL	25	WVDEP	No	100% ND and CRQL ≤ SL
Toluene	108-88-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	490		RSL	820	WVDEP	No	100% ND and CRQL ≤ SL
trans-1,2-Dichloroethene	156-60-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	7		RSL	75	WVDEP	No	100% ND and CRQL ≤ SL
trans-1,3-Dichloropropene	10061-02-6	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	1.8	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Trichloroethene	79-01-6	N/A		N/A		mg/kg	N/A	N/A	0/13	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.41		RSL	1	WVDEP	See Uncertainty	100% ND and CRQL > SL
Trichlorofluoromethane	75-69-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	2300		RSL	790	WVDEP	No	100% ND and CRQL ≤ SL
Vinyl chloride	75-01-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0042 – 0.43	0.43	CRQL	N/A	0.059		RSL	0.061	WVDEP	See Uncertainty	100% ND and CRQL > SL
Semi-Volatile Organic Compounds (SVOCs)																					
1,1'-Biphenyl	92-52-4	0.024	J	0.024	J	mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	1/30	3%	0.18 – 0.25	0.024	MDC	N/A	4.7		RSL	51	WVDEP	No	CRQL and MDC ≤ SL
1,2,4,5-Tetrachlorobenzene	95-94-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	0.23		RSL	17	WVDEP	See Uncertainty	100% ND and CRQL > SL

Table A-2.1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0 – 0.5 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
1,4-Dioxane	123-91-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.071 – 0.1	0.1	CRQL	N/A	5.3		RSL	5.4	WVDEP	No	100% ND and CRQL ≤ SL
2,2'-Oxybis(1-chloropropane)	108-60-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	310		RSL	5.1	WVDEP	No	100% ND and CRQL ≤ SL
2,3,4,6-Tetrachlorophenol	58-90-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	190		RSL	1900	WVDEP	No	100% ND and CRQL ≤ SL
2,4,5-Trichlorophenol	95-95-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	630		RSL	6300	WVDEP	No	100% ND and CRQL ≤ SL
2,4,6-Trichlorophenol	88-06-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	6.3		RSL	49	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dichlorophenol	120-83-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	19		RSL	190	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dimethylphenol	105-67-9	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	130		RSL	1300	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dinitrophenol	51-28-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	13		RSL	130	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dinitrotoluene	121-14-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	1.7		RSL	1.7	WVDEP	No	100% ND and CRQL ≤ SL
2,6-Dinitrotoluene	606-20-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	0.36		RSL	0.36	WVDEP	No	100% ND and CRQL ≤ SL
2-Chloronaphthalene	91-58-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	480		RSL	5000	WVDEP	No	100% ND and CRQL ≤ SL
2-Chlorophenol	95-57-8	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	39		RSL	340	WVDEP	No	100% ND and CRQL ≤ SL
2-Methylnaphthalene	91-57-6	0.0011	J	0.098		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	29/30	97%	0.0039 – 0.0039	0.098	MDC	N/A	24		RSL	310	WVDEP	No	CRQL and MDC ≤ SL
2-Methylphenol	95-48-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	320		RSL	3200	WVDEP	No	100% ND and CRQL ≤ SL
2-Nitroaniline	88-74-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	63		RSL	630	WVDEP	No	100% ND and CRQL ≤ SL
2-Nitrophenol	88-75-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	1900	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
3 & 4 Methylphenol	15831-10-4	0.035	J	0.068	J	mg/kg	Multiple Locations	N/A	3/21	14%	0.38 – 0.45	0.068	MDC	N/A	630	*	RSL	3200	WVDEP	No	CRQL and MDC ≤ SL
3,3'-Dichlorobenzidine	91-94-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	1.2		RSL	1.2	WVDEP	No	100% ND and CRQL ≤ SL
3-Nitroaniline	99-09-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	63	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
4,6-Dinitro-2-methylphenol	534-52-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	0.51		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Bromophenyl-phenylether	101-55-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
4-Chloro-3-methylphenol	59-50-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	630		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Chloroaniline	106-47-8	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	2.7		RSL	2.7	WVDEP	No	100% ND and CRQL ≤ SL
4-Chlorophenyl-phenylether	7005-72-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
4-Methylphenol	106-44-5	N/A		N/A		mg/kg	N/A	N/A	0/9	0%	0.35 – 0.49	0.49	CRQL	N/A	130		RSL	6300	WVDEP	No	100% ND and CRQL ≤ SL
4-Nitroaniline	100-01-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	25		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Nitrophenol	100-02-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	1900	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Acenaphthene	83-32-9	0.0011	J	0.029	J	mg/kg	SA-SB326 (11/15/2019)	0 - 0.5	22/30	73%	0.0039 – 0.23	0.029	MDC	N/A	360		RSL	4100	WVDEP	No	CRQL and MDC ≤ SL
Acenaphthylene	208-96-8	0.001	J	0.1		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	26/30	87%	0.0039 – 0.2	0.1	MDC	N/A	See Rationale		N/A	4200	WVDEP	See Uncertainty	No SL or surrogate toxicity available
Acetophenone	98-86-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	780		RSL	2500	WVDEP	No	100% ND and CRQL ≤ SL
Anthracene	120-12-7	0.0011	J	0.079		mg/kg	Multiple Locations	N/A	28/30	93%	0.004 – 0.2	0.079	MDC	N/A	1800		RSL	23000	WVDEP	No	CRQL and MDC ≤ SL
Atrazine	1912-24-9	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	2.4		RSL	2.4	WVDEP	No	100% ND and CRQL ≤ SL
Benzaldehyde	100-52-7	0.16	J	0.16	J	mg/kg	SA-SB319 (11/7/2019)	0 - 0.5	1/30	3%	0.35 – 0.49	0.16	MDC	N/A	170		RSL	170	WVDEP	No	CRQL and MDC ≤ SL
Benzo(a)anthracene	56-55-3	0.0018	J	0.31		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.31	MDC	N/A	1.1		RSL	1.5	WVDEP	No	MDC ≤ SL (CRQL N/A)
Benzo(a)pyrene	50-32-8	0.0014	J	0.29		mg/kg	SA-SB310 (11/7/2019)	0 - 0.5	30/30	100%	N/A	0.29	MDC	N/A	0.11		RSL	0.11	WVDEP	Yes	MDC > SL (CRQL N/A)
Benzo(b)fluoranthene	205-99-2	0.0019	J	0.48		mg/kg	SA-SB310 (11/7/2019)	0 - 0.5	30/30	100%	N/A	0.48	MDC	N/A	1.1		RSL	1.1	WVDEP	No	MDC ≤ SL (CRQL N/A)
Benzo(g,h,i)perylene	191-24-2	0.001	J	0.17	J	mg/kg	Multiple Locations	N/A	30/30	100%	N/A	0.17	MDC	N/A	See Rationale		N/A	1800	WVDEP	See Uncertainty	No SL or surrogate toxicity available
Benzo(k)fluoranthene	207-08-9	0.001	J	0.19	J	mg/kg	SA-SB310 (11/7/2019)	0 - 0.5	30/30	100%	N/A	0.19	MDC	N/A	11		RSL	11	WVDEP	No	MDC ≤ SL (CRQL N/A)
Bis(2-chloroethoxy)methane	111-91-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	19		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Bis(2-chloroethyl)ether	111-44-4	0.03	J	0.03	J	mg/kg	SA-SB319 (11/7/2019)	0 - 0.5	1/30	3%	0.35 – 0.49	0.03	MDC	N/A	0.23		RSL	0.24	WVDEP	No	MDC ≤ SL < CRQL
Bis(2-ethylhexyl)phthalate	117-81-7	0.022	J	0.1	J	mg/kg	SA-SB312 (11/7/2019)	0 - 0.5	11/30	37%	0.18 – 0.25	0.1	MDC	N/A	39		RSL	39	WVDEP	No	CRQL and MDC ≤ SL
Butylbenzylphthalate	85-68-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	290		RSL	290	WVDEP	No	100% ND and CRQL ≤ SL
Caprolactam	105-60-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	3100		RSL	31000	WVDEP	No	100% ND and CRQL ≤ SL
Carbazole	86-74-8	0.047	J	0.047	J	mg/kg	SA-SB326 (11/15/2019)	0 - 0.5	1/30	3%	0.35 – 0.49	0.047	MDC	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
Chrysene	218-01-9	0.0027	J	0.35		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.35	MDC	N/A	110		RSL	110	WVDEP	No	MDC ≤ SL (CRQL N/A)
Dibenz(a,h)anthracene	53-70-3	0.001	J	0.031		mg/kg	SA-SB369 (11/21/2019)	0 - 0.5	15/30	50%	0.2 – 0.23	0.031	MDC	N/A	0.11		RSL	0.11	WVDEP	No	MDC ≤ SL < CRQL
Dibenzofuran	132-64-9	0.018	J	0.039	J	mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	5/30	17%	0.18 – 0.25	0.039	MDC	N/A	7.8		RSL	78	WVDEP	No	CRQL and MDC ≤ SL
Diethylphthalate	84-66-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	5100		RSL	51000	WVDEP	No	100% ND and CRQL ≤ SL
Dimethylphthalate	131-11-3	0.15	J	0.28		mg/kg	SA-SB321 (11/25/2019)	0 - 0.5	7/30	23%	0.18 – 0.25	0.28	MDC	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
Di-N-Butylphthalate	84-74-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	630		RSL	6300	WVDEP	No	100% ND and CRQL ≤ SL
Di-N-Octyl Phthalate	117-84-0	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	63		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Fluoranthene	206-44-0	0.0027	J	0.58		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	29/30	97%	0.0039 – 0.0039	0.58	MDC	N/A	240		RSL	2400	WVDEP	No	CRQL and MDC ≤ SL
Fluorene	86-73-7	0.001	J	0.036		mg/kg	Multiple Locations	N/A	20/30	67%	0.0039 – 0.23	0.036	MDC	N/A	240		RSL	2900	WVDEP	No	CRQL and MDC ≤ SL
Hexachlorobenzene	118-74-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	0.078		RSL	0.22	WVDEP	See Uncertainty	100% ND and CRQL > SL
Hexachlorobutadiene	87-68-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	1.2		RSL	1.3	WVDEP	No	100% ND and CRQL ≤ SL

Table A-2.1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0 – 0.5 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
Hexachlorocyclopentadiene	77-47-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.49	0.49	CRQL	N/A	0.18		RSL	1.9	WVDEP	See Uncertainty	100% ND and CRQL > SL
Hexachloroethane	67-72-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	1.8		RSL	2	WVDEP	No	100% ND and CRQL ≤ SL
Indeno(1,2,3-cd)pyrene	193-39-5	0.00084	J	0.19	J	mg/kg	SA-SB310 (11/7/2019)	0 - 0.5	30/30	100%	N/A	0.19	MDC	N/A	1.1		RSL	1.1	WVDEP	No	MDC ≤ SL (CRQL N/A)
Isophorone	78-59-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	570		RSL	570	WVDEP	No	100% ND and CRQL ≤ SL
Naphthalene	91-20-3	0.0013	J	0.13		mg/kg	SA-SB328 (11/15/2019)	0 - 0.5	28/30	93%	0.0039 – 0.004	0.13	MDC	N/A	2		RSL	2.4	WVDEP	No	CRQL and MDC ≤ SL
Naphthalene, 1-methyl-	90-12-0	0.0032	J	0.041	J	mg/kg	SB408 (7/16/2021)	0 - 0.5	7/9	78%	0.0039 – 0.004	0.041	MDC	N/A	18		RSL	24	WVDEP	No	CRQL and MDC ≤ SL
Nitrobenzene	98-95-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	5.1		RSL	5.5	WVDEP	No	100% ND and CRQL ≤ SL
N-Nitroso-di-n-propylamine (NDPA)	621-64-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	0.078		RSL	0.078	WVDEP	See Uncertainty	100% ND and CRQL > SL
N-Nitrosodiphenylamine	86-30-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	110		RSL	110	WVDEP	No	100% ND and CRQL ≤ SL
Pentachlorophenol	87-86-5	0.001	J	0.012		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	2/30	7%	0.0071 – 0.45	0.012	MDC	N/A	1		RSL	1	WVDEP	No	CRQL and MDC ≤ SL
Phenanthrene	85-01-8	0.0011	J	0.45	J	mg/kg	SA-SB326 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.45	MDC	N/A	See Rationale		N/A	23000	WVDEP	See Uncertainty	No SL or surrogate toxicity available
Phenol	108-95-2	0.045	J	0.073	J	mg/kg	SA-SB321 (11/25/2019)	0 - 0.5	5/30	17%	0.35 – 0.49	0.073	MDC	N/A	1900		RSL	19000	WVDEP	No	CRQL and MDC ≤ SL
Pyrene	129-00-0	0.0016	J	0.47	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.47	MDC	N/A	180		RSL	2300	WVDEP	No	MDC ≤ SL (CRQL N/A)
Pesticides																					
4,4'-DDD	72-54-8	0.00045	J	0.0029	J	mg/kg	SA-SB326 (11/15/2019)	0 - 0.5	9/28	32%	0.0035 – 0.0049	0.0029	MDC	N/A	0.19		RSL	1.9	WVDEP	No	CRQL and MDC ≤ SL
4,4'-DDE	72-55-9	0.00028	J	0.0065	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	8/30	27%	0.0035 – 0.0049	0.0065	MDC	N/A	2		RSL	2	WVDEP	No	CRQL and MDC ≤ SL
4,4'-DDT	50-29-3	0.0009	J	0.52		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	7/30	23%	0.0035 – 0.0046	0.52	MDC	N/A	1.9		RSL	1.9	WVDEP	No	CRQL and MDC ≤ SL
Aldrin	309-00-2	0.00024	J	0.00069	J	mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	2/29	7%	0.0018 – 0.0025	0.00069	MDC	N/A	0.039		RSL	0.039	WVDEP	No	CRQL and MDC ≤ SL
alpha-BHC	319-84-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0018 – 0.0025	0.0025	CRQL	N/A	0.086		RSL	0.086	WVDEP	No	100% ND and CRQL ≤ SL
beta-BHC	319-85-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0018 – 0.0025	0.0025	CRQL	N/A	0.3		RSL	0.3	WVDEP	No	100% ND and CRQL ≤ SL
cis-Chlordane	5103-71-9	0.00038	J	0.0011	J	mg/kg	SA-SB326 (11/15/2019)	0 - 0.5	5/30	17%	0.0018 – 0.0025	0.0011	MDC	N/A	3.6		RSL	N/A	--	No	CRQL and MDC ≤ SL
delta-BHC	319-86-8	0.0041	J	0.0041	J	mg/kg	SB407 (7/15/2021)	0 - 0.5	1/30	3%	0.0018 – 0.0024	0.0041	MDC	N/A	0.086	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Dieldrin	60-57-1	0.0012	J	0.0083	J	mg/kg	SB408 (7/16/2021)	0 - 0.5	6/27	22%	0.0038 – 0.0046	0.0083	MDC	N/A	0.034		RSL	0.042	WVDEP	No	CRQL and MDC ≤ SL
Endosulfan I	959-98-8	0.00054	J	0.0011	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	3/30	10%	0.0018 – 0.0025	0.0011	MDC	N/A	47	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Endosulfan II	33213-65-9	0.00044	J	0.0059	J	mg/kg	SB408 (7/16/2021)	0 - 0.5	7/30	23%	0.0037 – 0.0046	0.0059	MDC	N/A	47	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Endosulfan Sulfate	1031-07-8	0.00061	J	0.11	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	3/30	10%	0.0035 – 0.0049	0.11	MDC	N/A	38		RSL	N/A	--	No	CRQL and MDC ≤ SL
Endrin	72-20-8	0.00022	J	0.0074	J	mg/kg	SB408 (7/16/2021)	0 - 0.5	9/30	30%	0.0038 – 0.0049	0.0074	MDC	N/A	1.9		RSL	19	WVDEP	No	CRQL and MDC ≤ SL
Endrin Aldehyde	7421-93-4	0.00049	J	0.0011	J	mg/kg	SA-SB326 (11/15/2019)	0 - 0.5	2/28	7%	0.0035 – 0.0049	0.0011	MDC	N/A	1.9	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Endrin Ketone	53494-70-5	N/A		N/A		mg/kg	N/A	N/A	0/27	0%	0.0035 – 0.0049	0.0049	CRQL	N/A	1.9	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
gamma-BHC (Lindane)	58-89-9	0.0002	J	0.0024	J	mg/kg	SA-SB326 (11/15/2019)	0 - 0.5	14/30	47%	0.0019 – 0.0024	0.0024	MDC	N/A	0.071		RSL	0.57	WVDEP	No	CRQL and MDC ≤ SL
Heptachlor	76-44-8	0.00033	J	0.00045	J	mg/kg	SA-SB326 (11/15/2019)	0 - 0.5	2/30	7%	0.0018 – 0.0025	0.00045	MDC	N/A	0.13		RSL	0.14	WVDEP	No	CRQL and MDC ≤ SL
Heptachlor Epoxide	1024-57-3	0.00038	J	0.00077	J	mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	4/30	13%	0.0018 – 0.0025	0.00077	MDC	N/A	0.07		RSL	0.071	WVDEP	No	CRQL and MDC ≤ SL
Methoxychlor	72-43-5	0.003	J	0.014	J	mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	4/30	13%	0.018 – 0.025	0.014	MDC	N/A	32		RSL	320	WVDEP	No	CRQL and MDC ≤ SL
Toxaphene	8001-35-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.25	0.25	CRQL	N/A	0.49		RSL	0.49	WVDEP	No	100% ND and CRQL ≤ SL
trans-Chlordane	5103-74-2	0.00083	J	0.013		mg/kg	SB408 (7/16/2021)	0 - 0.5	3/27	11%	0.0019 – 0.0025	0.013	MDC	N/A	3.6		RSL	N/A	--	No	CRQL and MDC ≤ SL
Polychlorinated Biphenyls (PCBs)																					
Aroclor 1016	12674-11-2	N/A		N/A		mg/kg	N/A	N/A	0/10	0%	0.038 – 0.045	0.045	CRQL	N/A	0.41		RSL	5.5	WVDEP	No	100% ND and CRQL ≤ SL
Aroclor 1221	11104-28-2	N/A		N/A		mg/kg	N/A	N/A	0/10	0%	0.038 – 0.045	0.045	CRQL	N/A	0.2		RSL	0.26	WVDEP	No	100% ND and CRQL ≤ SL
Aroclor 1232	11141-16-5	N/A		N/A		mg/kg	N/A	N/A	0/10	0%	0.038 – 0.045	0.045	CRQL	N/A	0.17		RSL	0.22	WVDEP	No	100% ND and CRQL ≤ SL
Aroclor 1242	53469-21-9	N/A		N/A		mg/kg	N/A	N/A	0/10	0%	0.038 – 0.045	0.045	CRQL	N/A	0.23		RSL	0.31	WVDEP	No	100% ND and CRQL ≤ SL
Aroclor 1248	12672-29-6	N/A		N/A		mg/kg	N/A	N/A	0/10	0%	0.038 – 0.045	0.045	CRQL	N/A	0.23		RSL	0.31	WVDEP	No	100% ND and CRQL ≤ SL
Aroclor 1254	11097-69-1	N/A		N/A		mg/kg	N/A	N/A	0/10	0%	0.038 – 0.045	0.045	CRQL	N/A	0.12		RSL	0.32	WVDEP	No	100% ND and CRQL ≤ SL
Aroclor 1260	11096-82-5	0.028	J	1.6		mg/kg	SA-SB328 (11/15/2019)	0 - 0.5	9/10	90%	0.039 – 0.039	1.6	MDC	N/A	0.24		RSL	0.33	WVDEP	Yes	MDC > SL
Aroclor 1262	37324-23-5	N/A		N/A		mg/kg	N/A	N/A	0/10	0%	0.038 – 0.045	0.045	CRQL	N/A	0.23	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Aroclor 1268	11100-14-4	N/A		N/A		mg/kg	N/A	N/A	0/10	0%	0.038 – 0.045	0.045	CRQL	N/A	0.23	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
TOTAL AROCLOR HALFND	CALC021	0.1755		1.78		mg/kg	SA-SB328 (11/15/2019)	0 - 0.5	10/10	100%	N/A	1.78	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
PCBs - Congeners																					
PCB-1	2051-60-7	0.000004		0.00099		mg/kg	SB407 (7/15/2021)	0 - 0.5	24/30	80%	0.000002 – 0.0013	0.00099	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-10	33146-45-1	0.0000012	J	0.00054		mg/kg	SB407 (7/15/2021)	0 - 0.5	18/30	60%	0.0000019 – 0.0013	0.00054	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-100	39485-83-1	0.0000019	J	0.00027		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	9/14	64%	0.000002 – 0.000002	0.00027	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-101/90	PCB101/90	0.000075		0.39		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.39	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-103	60145-21-3	0.00000058	J	0.00063		mg/kg	SB408 (7/16/2021)	0 - 0.5	27/30	90%	0.000002 – 0.0013	0.00063	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-104	56558-16-8	0.0000012	J	0.0000076	J	mg/kg	SB403 (7/16/2021)	0 - 0.5	4/30	13%	0.0000019 – 0.0013	0.0000076	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-105	32598-14-4	0.000014		0.021		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.021	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-106	70424-69-0	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0000019 – 0.0013	0.0013	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0 – 0.5 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-107	70424-68-9	0.000072	J	0.002		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	7/7	100%	N/A	0.002	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-107/108	70424-68-9/703~	0.0000038	J	0.0025		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0025	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-107/124	70424-68-9/704~	0.0000028	J	0.0013		mg/kg	SB407 (7/15/2021)	0 - 0.5	9/9	100%	N/A	0.0013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-108/124	70362-41-3/704~	0.000044	J	0.0014		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	7/7	100%	N/A	0.0014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-109	74472-35-8	0.0000027	J	0.0016		mg/kg	SB407 (7/15/2021)	0 - 0.5	9/23	39%	0.000002 – 0.000002	0.0016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-11	2050-67-1	0.000014		0.00035		mg/kg	SB403 (7/16/2021)	0 - 0.5	20/30	67%	0.000009 – 0.0013	0.00035	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-110	38380-03-9	0.000059		0.15		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.15	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-110/115	38380-03-9/744~	0.000037		0.092		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.092	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-111	39635-32-0	0.000012		0.000012		mg/kg	SB408 (7/16/2021)	0 - 0.5	1/16	6%	0.0000019 – 0.0013	0.000012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-111/115	39635-32-0/744~	0.0000053		0.00019		mg/kg	SA-SB328 (11/15/2019)	0 - 0.5	12/14	86%	0.000004 – 0.000004	0.00019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-112	74472-36-9	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0000019 – 0.0013	0.0013	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-113	68194-10-5	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-114	74472-37-0	0.000003	J	0.0017		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	27/30	90%	0.0000012 – 0.00034	0.0017	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-118	31508-00-6	0.000029		0.05		mg/kg	SB407 (7/15/2021)	0 - 0.5	16/16	100%	N/A	0.05	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-118/106	31508-00-6/704~	0.000043		0.11		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.11	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-119	56558-17-9	0.0000032		0.00073		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	13/14	93%	0.000002 – 0.000002	0.00073	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-12	2974-92-7	0.0000025		0.000092		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	13/14	93%	0.000002 – 0.000002	0.000092	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-12/13	2974-92-7/2974~	0.000016	J	0.0038		mg/kg	SB407 (7/15/2021)	0 - 0.5	9/16	56%	0.000018 – 0.0027	0.0038	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-120	68194-12-7	0.00000055	J	0.001		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	22/30	73%	0.000002 – 0.0013	0.001	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-121	56558-18-0	0.0000047	J	0.0000084	J	mg/kg	SB408 (7/16/2021)	0 - 0.5	2/30	7%	0.0000019 – 0.0013	0.0000084	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-122	76842-07-4	0.00000053	J	0.00066		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	20/30	67%	0.0000019 – 0.0013	0.00066	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-123	65510-44-3	0.0000058		0.0013		mg/kg	SB408 (7/16/2021)	0 - 0.5	26/30	87%	0.000001 – 0.00034	0.0013	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-124	70424-70-3	0.0000032		0.0058		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0058	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-126	57465-28-8	0.0000009	J	0.0011		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	25/30	83%	0.0000012 – 0.0004	0.0011	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-127	39635-33-1	0.0000022	J	0.0000071		mg/kg	SA-SB310 (11/7/2019)	0 - 0.5	2/30	7%	0.0000019 – 0.0013	0.0000071	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-128/162	38380-07-3/396~	0.000017		0.065		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.065	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-128/166	38380-07-3/414~	0.00011		0.04		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.04	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-129	55215-18-4	0.0000058		0.013		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-129/138/163	55215-18-4/350~	0.0014		0.58		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.58	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-13	2974-90-5	0.0000027		0.000084		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	13/14	93%	0.000002 – 0.000002	0.000084	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-130	52663-66-8	0.00001		0.03		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.03	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-131	61798-70-7	0.0000075	J	0.0034		mg/kg	SB403 (7/16/2021)	0 - 0.5	15/16	94%	0.000009 – 0.000009	0.0034	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-131/133	61798-70-7/356~	0.0000049		0.014		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-132	38380-05-1	0.00011		0.13		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.13	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-132/161	38380-05-1/744~	0.00004		0.21		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.21	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-133	35694-04-3	0.000018		0.0049		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.0049	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-134	52704-70-8	0.00019	J	0.018		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	7/7	100%	N/A	0.018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-134/143	52704-70-8/681~	0.0000074		0.03		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	23/23	100%	N/A	0.03	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-135	52744-13-5	0.000026		0.12		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.12	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-135/151	52744-13-5/526~	0.00036		0.21		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.21	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-136	38411-22-2	0.000026		0.14		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.14	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-137	35694-06-5	0.0000033		0.036		mg/kg	SB407 (7/15/2021)	0 - 0.5	23/30	77%	0.000009 – 0.0000096	0.036	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-138/163/164	35065-28-2/744~	0.00023		0.98	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.98	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-139/140	56030-56-9/592~	0.0000045	J	0.0007		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	14/16	88%	0.000018 – 0.0027	0.0007	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-139/149	56030-56-9/383~	0.00018		0.94	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.94	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-14	34883-41-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0013	0.0013	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-140	59291-64-4	0.000044		0.00019		mg/kg	SA-SB318 (11/8/2019)	0 - 0.5	3/14	21%	0.000002 – 0.000002	0.00019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-141	52712-04-6	0.00005		0.26	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.26	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-142	41411-61-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0013	0.0013	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-143	68194-15-0	N/A		N/A		mg/kg	N/A	N/A	0/7	0%	0.0000019 – 0.0013	0.0013	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-144	68194-14-9	0.000011		0.068		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.068	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-145	74472-40-5	0.00000047	J	0.000052	J	mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	3/30	10%	0.0000019 – 0.0013	0.000052	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-146	51908-16-8	0.00021		0.068		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.068	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-146/165	51908-16-8/744~	0.000033		0.13		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.13	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-147	68194-13-8	0.0000021		0.003		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.003	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0 – 0.5 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-147/149	68194-13-8/383~	0.00083		0.46		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.46	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-148	74472-41-6	0.0000026		0.00012		mg/kg	SB407 (7/15/2021)	0 - 0.5	10/30	33%	0.000002 – 0.0013	0.00012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-15	2050-68-2	0.0000052		0.042		mg/kg	SB407 (7/15/2021)	0 - 0.5	29/30	97%	0.000009 – 0.000009	0.042	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-150	68194-08-1	0.0000026		0.00016		mg/kg	SB408 (7/16/2021)	0 - 0.5	20/30	67%	0.000002 – 0.0013	0.00016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-151	52663-63-5	0.000064		0.36	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.36	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-152	68194-09-2	0.00000078	J	0.000041	J	mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	14/30	47%	0.000002 – 0.0013	0.000041	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-153	35065-27-1	0.00026		1.2	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	1.2	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-153/168	35065-27-1/592~	0.0018		0.6		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.6	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-154	60145-22-4	0.0000066		0.001		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	20/21	95%	0.000002 – 0.000002	0.001	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-155	33979-03-2	0.0000046	J	0.0000066		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	3/30	10%	0.0000019 – 0.0013	0.0000066	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-156	38380-08-4	0.000015		0.075	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.075	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-156/157	38380-08-4/697~	0.000035		0.038		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.038	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-157	69782-90-7	0.000024		0.0046		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	13/14	93%	0.0000016 – 0.0000016	0.0046	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-158	74472-42-7	0.000061		0.046		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-158/160	74472-42-7/414~	0.00002		0.1		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.1	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-159	39635-35-3	0.0000043		0.0088		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	23/30	77%	0.0000019 – 0.0013	0.0088	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-16	38444-78-9	0.0000084		0.0048		mg/kg	SB407 (7/15/2021)	0 - 0.5	27/30	90%	0.000002 – 0.0013	0.0048	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-160	41411-62-5	N/A		N/A		mg/kg	N/A	N/A	0/7	0%	0.0000019 – 0.0013	0.0013	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-161	74472-43-8	0.0000014	J	0.015		mg/kg	SB452 (7/15/2021)	0 - 0.5	4/16	25%	0.0000019 – 0.0013	0.015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-162	39635-34-2	0.0000024	J	0.0034		mg/kg	SB407 (7/15/2021)	0 - 0.5	10/16	63%	0.0000019 – 0.00028	0.0034	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-164	74472-45-0	0.000067		0.035		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	14/16	88%	0.000018 – 0.000018	0.035	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-165	74472-46-1	0.0000022	J	0.0014		mg/kg	SB408 (7/16/2021)	0 - 0.5	7/16	44%	0.0000019 – 0.0013	0.0014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-166	41411-63-6	0.000002		0.0019		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	12/14	86%	0.000002 – 0.000002	0.0019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-167	52663-72-6	0.0000074		0.027		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.027	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-168	59291-65-5	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-169	32774-16-6	0.0000043		0.00098	Z	mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	15/30	50%	0.00000047 – 0.00042	0.00098	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-17	37680-66-3	0.000013		0.015		mg/kg	SB407 (7/15/2021)	0 - 0.5	27/30	90%	0.000002 – 0.0013	0.015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-170	35065-30-6	0.00011		0.54	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.54	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-171	52663-71-5	0.000024		0.14		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.14	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-171/173	52663-71-5/681~	0.000096		0.076		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.076	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-172	52663-74-8	0.000022		0.083		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.083	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-173	68194-16-1	0.000044		0.012		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	13/14	93%	0.000002 – 0.000002	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-174	38411-25-5	0.00012		0.49	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.49	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-175	40186-70-7	0.0000043		0.018		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-176	52663-65-7	0.000011		0.056		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.056	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-177	52663-70-4	0.000063		0.31	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.31	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-178	52663-67-9	0.000022		0.097		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.097	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-179	52663-64-6	0.000042		0.2		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.2	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-18	37680-65-2	0.0000038		0.00064		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.00064	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-18/30	37680-65-2/356~	0.000023		0.01		mg/kg	SB407 (7/15/2021)	0 - 0.5	15/16	94%	0.000018 – 0.000018	0.01	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-180	35065-29-3	0.00025		0.92	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.92	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-180/193	35065-29-3/697~	0.0011		0.54		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.54	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-181	74472-47-2	0.0000054	J	0.00076		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	11/30	37%	0.000002 – 0.0013	0.00076	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-182	60145-23-5	0.0000029	J	0.00034		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	4/16	25%	0.0000019 – 0.0013	0.00034	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-182/187	60145-23-5/526~	0.00015		0.55	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.55	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-183	52663-69-1	0.000053		0.26	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.26	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-183/185	52663-69-1/527~	0.00023		0.17		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.17	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-184	74472-48-3	0.00000084	J	0.00017		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	12/30	40%	0.000002 – 0.0013	0.00017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-185	52712-05-7	0.000015		0.061		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.061	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-186	74472-49-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0013	0.0013	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-187	52663-68-0	0.00065		0.26		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.26	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-188	74487-85-7	0.0000018	J	0.00015		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	18/30	60%	0.000002 – 0.0013	0.00015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-189	39635-31-9	0.0000044		0.019		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.019	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-19	38444-73-4	0.0000022		0.0034		mg/kg	SB407 (7/15/2021)	0 - 0.5	26/30	87%	0.000002 – 0.0013	0.0034	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-190	41411-64-7	0.000027		0.12		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.12	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0 – 0.5 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-191	74472-50-7	0.0000089	J	0.02		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	29/30	97%	0.000002 – 0.000002	0.02	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-192	74472-51-8	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0013	0.0013	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-193	69782-91-8	0.000017		0.062		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.062	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-194	35694-08-7	0.000046		0.21	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.21	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-195	52663-78-2	0.000021		0.1		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.1	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-196	42740-50-1	0.00011		0.052		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.052	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-196/203	42740-50-1/526~	0.000064		0.23		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.23	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-197	33091-17-7	0.0000022		0.0067		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0067	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-197/200	33091-17-7/526~	0.000037		0.016		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-198	68194-17-2	0.0000062		0.014		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-198/199	68194-17-2/526~	0.00026		0.096		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.096	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-199	52663-75-9	0.000061		0.19		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.19	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-2	2051-61-8	0.0000016	J	0.00019		mg/kg	SB407 (7/15/2021)	0 - 0.5	18/30	60%	0.0000019 – 0.0013	0.00019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-20/21/33	38444-84-7/557~	0.0000026	J	0.0012		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-20/28	38444-84-7/701~	0.00015	J	0.08		mg/kg	SB407 (7/15/2021)	0 - 0.5	15/16	94%	0.000018 – 0.000018	0.08	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-200	52663-73-7	0.0000081		0.027		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.027	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-201	40186-71-8	0.0000059		0.023		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.023	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-202	2136-99-4	0.0000099		0.029		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.029	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-203	52663-76-0	0.00021		0.064		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	16/16	100%	N/A	0.064	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-204	74472-52-9	0.000011	J	0.000011	J	mg/kg	SB407 (7/15/2021)	0 - 0.5	1/30	3%	0.0000019 – 0.0013	0.000011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-205	74472-53-0	0.0000043		0.012		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-206	40186-72-9	0.000017		0.038		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	30/30	100%	N/A	0.038	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-207	52663-79-3	0.0000021		0.0046		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.0046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-208	52663-77-1	0.0000041		0.013		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	30/30	100%	N/A	0.013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-209 (Decachlorobiphenyl)	2051-24-3	0.000012		0.039		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	30/30	100%	N/A	0.039	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-21/33	55702-46-0/384~	0.000044	J	0.021		mg/kg	SB407 (7/15/2021)	0 - 0.5	15/16	94%	0.000018 – 0.000018	0.021	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-22	38444-85-8	0.0000049		0.04		mg/kg	SB407 (7/15/2021)	0 - 0.5	29/30	97%	0.000009 – 0.000009	0.04	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-23	55720-44-0	0.0000013	J	0.000017	J	mg/kg	SB407 (7/15/2021)	0 - 0.5	3/30	10%	0.0000019 – 0.0013	0.000017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-24	55702-45-9	0.0000016	J	0.0015		mg/kg	SB407 (7/15/2021)	0 - 0.5	24/30	80%	0.000002 – 0.0013	0.0015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-25	55712-37-3	0.0000052		0.0057		mg/kg	SB407 (7/15/2021)	0 - 0.5	28/30	93%	0.000002 – 0.000009	0.0057	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-26	38444-81-4	0.0000014	J	0.00061		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.00061	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-26/29	38444-81-4/158~	0.000017	J	0.014		mg/kg	SB407 (7/15/2021)	0 - 0.5	15/16	94%	0.000018 – 0.000018	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-27	38444-76-7	0.0000015	J	0.0029		mg/kg	SB407 (7/15/2021)	0 - 0.5	27/30	90%	0.000002 – 0.0013	0.0029	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-28	7012-37-5	0.000012		0.0049		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0049	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-29	15862-07-4	0.000002		0.000018		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	8/14	57%	0.000002 – 0.000002	0.000018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-3	2051-62-9	0.0000031	J	0.0013		mg/kg	SB407 (7/15/2021)	0 - 0.5	27/30	90%	0.000002 – 0.0013	0.0013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-30	35693-92-6	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-31	16606-02-3	0.0000088		0.06		mg/kg	SB407 (7/15/2021)	0 - 0.5	29/30	97%	0.000009 – 0.000009	0.06	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-32	38444-77-8	0.0000026		0.017		mg/kg	SB407 (7/15/2021)	0 - 0.5	29/30	97%	0.000009 – 0.000009	0.017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-34	37680-68-5	0.0000014	J	0.00023		mg/kg	SB407 (7/15/2021)	0 - 0.5	14/30	47%	0.000002 – 0.0013	0.00023	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-35	37680-69-6	0.000003		0.00088		mg/kg	SB407 (7/15/2021)	0 - 0.5	22/30	73%	0.000002 – 0.0013	0.00088	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-36	38444-87-0	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0013	0.0013	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-37	38444-90-5	0.0000015	J	0.044		mg/kg	SB407 (7/15/2021)	0 - 0.5	30/30	100%	N/A	0.044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-38	53555-66-1	0.0000017	J	0.000011		mg/kg	SA-SB318 (11/8/2019)	0 - 0.5	7/30	23%	0.0000019 – 0.0013	0.000011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-39	38444-88-1	0.00000075	J	0.0000021		mg/kg	SA-SB320 (11/25/2019)	0 - 0.5	4/30	13%	0.000002 – 0.0013	0.0000021	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-4	13029-08-8	0.0000059		0.0019		mg/kg	SB407 (7/15/2021)	0 - 0.5	24/30	80%	0.000002 – 0.0013	0.0019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-40	38444-93-8	0.0000032		0.00045		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.00045	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-40/41/71	38444-93-8/526~	0.000029		0.029		mg/kg	SB407 (7/15/2021)	0 - 0.5	8/9	89%	0.000027 – 0.000027	0.029	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-40/71	NOB20161110_001	0.000053	J	0.012		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	7/7	100%	N/A	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-41	52663-59-9	0.0000057	J	0.0022		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	5/7	71%	0.00022 – 0.0013	0.0022	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-41/64/71/72	52663-59-9/526~	0.000025		0.0034		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0034	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-42	36559-22-5	0.000018		0.014		mg/kg	SB407 (7/15/2021)	0 - 0.5	14/16	88%	0.000009 – 0.0013	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-42/59	36559-22-5/744~	0.00001		0.0011		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-43	70362-46-8	0.0000011	J	0.0013		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	6/16	38%	0.000009 – 0.0013	0.0013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-43/49	70362-46-8/414~	0.000026		0.0044		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0 – 0.5 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-44	41464-39-5	0.000013		0.0036		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0036	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-44/47/65	41464-39-5/243~	0.000075		0.042		mg/kg	SB407 (7/15/2021)	0 - 0.5	14/16	88%	0.000027 – 0.004	0.042	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-45	70362-45-7	0.0000044		0.00049		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.00049	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-45/51	70362-45-7/681~	0.0000069	J	0.0075		mg/kg	SB407 (7/15/2021)	0 - 0.5	15/16	94%	0.000018 – 0.000018	0.0075	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-46	41464-47-5	0.0000018	J	0.0015		mg/kg	SB407 (7/15/2021)	0 - 0.5	27/30	90%	0.000009 – 0.0013	0.0015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-47	2437-79-8	0.00001		0.0017		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-48	70362-47-9	0.00000083	J	0.013		mg/kg	SB407 (7/15/2021)	0 - 0.5	13/16	81%	0.000018 – 0.0013	0.013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-48/75	70362-47-9/325~	0.0000036	J	0.00041		mg/kg	SA-SB328 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.00041	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-49/69	41464-40-8/602~	0.0000023	J	0.03		mg/kg	SB407 (7/15/2021)	0 - 0.5	16/16	100%	N/A	0.03	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-5	16605-91-7	0.0000066		0.00022		mg/kg	SA-SB318 (11/8/2019)	0 - 0.5	4/30	13%	0.0000019 – 0.0013	0.00022	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-50	62796-65-0	0.0000017	J	0.0000087		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	7/14	50%	0.000002 – 0.000002	0.0000087	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-50/53	62796-65-0/414~	0.0000054	J	0.0057		mg/kg	SB407 (7/15/2021)	0 - 0.5	14/16	88%	0.000018 – 0.0027	0.0057	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-51	68194-04-7	0.0000012	J	0.00016		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.00016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-52	35693-99-3	0.00016		0.044		mg/kg	SB407 (7/15/2021)	0 - 0.5	15/16	94%	0.000009 – 0.000009	0.044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-52/69	35693-99-3/602~	0.00003		0.019		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-53	41464-41-9	0.0000037		0.00042		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.00042	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-54	15968-05-5	0.00000095	J	0.0001		mg/kg	SB407 (7/15/2021)	0 - 0.5	15/30	50%	0.0000019 – 0.0013	0.0001	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-55	74338-24-2	0.00000083	J	0.00096		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	21/30	70%	0.0000019 – 0.0013	0.00096	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-56	41464-43-1	0.000037		0.017		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	13/16	81%	0.000009 – 0.000018	0.017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-56/60	41464-43-1/330~	0.000017		0.0044		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-57	70424-67-8	0.0000012	J	0.000079	J	mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	14/30	47%	0.0000019 – 0.0013	0.000079	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-58	41464-49-7	0.00000071	J	0.0018		mg/kg	SB403 (7/16/2021)	0 - 0.5	13/30	43%	0.0000019 – 0.0013	0.0018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-59/62/75	74472-33-6/542~	0.0000052	J	0.004		mg/kg	SB407 (7/15/2021)	0 - 0.5	13/16	81%	0.000027 – 0.004	0.004	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-6	25569-80-6	0.0000056		0.0046		mg/kg	SB407 (7/15/2021)	0 - 0.5	23/30	77%	0.000002 – 0.0013	0.0046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-60	33025-41-1	0.000017		0.011		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	12/16	75%	0.000009 – 0.000018	0.011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-61/70	33284-53-6/325~	0.000025		0.1		mg/kg	SB407 (7/15/2021)	0 - 0.5	22/23	96%	0.000036 – 0.000036	0.1	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-61/70/74/76	TTNUS817	0.00041	J	0.04		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	7/7	100%	N/A	0.04	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-62	54230-22-7	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-63	74472-34-7	0.0000054	J	0.0015		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	26/30	87%	0.000002 – 0.0013	0.0015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-64	52663-58-8	0.0000018	J	0.023		mg/kg	SB407 (7/15/2021)	0 - 0.5	16/16	100%	N/A	0.023	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-65	33284-54-7	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-66	32598-10-0	0.00012		0.069		mg/kg	SB407 (7/15/2021)	0 - 0.5	15/16	94%	0.000009 – 0.000009	0.069	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-66/76	32598-10-0/703~	0.000031		0.01		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.01	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-67	73575-53-8	0.0000038		0.001		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	25/30	83%	0.000002 – 0.0013	0.001	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-68	73575-52-7	0.00000076	J	0.000046		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	22/30	73%	0.000002 – 0.0013	0.000046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-7	33284-50-3	0.0000015	J	0.00054		mg/kg	SB407 (7/15/2021)	0 - 0.5	21/30	70%	0.0000019 – 0.0013	0.00054	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-72	41464-42-0	0.0000018	J	0.00019	J	mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	9/16	56%	0.000009 – 0.0013	0.00019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-73	74338-23-1	0.0000011	J	0.000018		mg/kg	SA-SB317 (11/8/2019)	0 - 0.5	9/30	30%	0.0000019 – 0.0013	0.000018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-74	32690-93-0	0.000013		0.0033		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.0033	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-77	32598-13-3	0.000006		0.0075	J	mg/kg	SB407 (7/15/2021)	0 - 0.5	29/30	97%	0.0000018 – 0.0000018	0.0075	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-78	70362-49-1	0.0000015	J	0.0000083		mg/kg	SA-SB318 (11/8/2019)	0 - 0.5	6/30	20%	0.0000019 – 0.0013	0.0000083	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-79	41464-48-6	0.0000035		0.00017		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	17/30	57%	0.000002 – 0.0013	0.00017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-8	34883-43-7	0.000002		0.021		mg/kg	SB407 (7/15/2021)	0 - 0.5	29/30	97%	0.000009 – 0.000009	0.021	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-80	33284-52-5	0.000065	J+	0.000065	J+	mg/kg	SB404 (7/16/2021)	0 - 0.5	1/30	3%	0.0000019 – 0.0013	0.000065	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-81	70362-50-4	0.00000098	J	0.00097		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	24/30	80%	0.0000038 – 0.00029	0.00097	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-82	52663-62-4	0.0000014	J	0.0041		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	27/30	90%	0.000018 – 0.0013	0.0041	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-83	60145-20-2	0.00004	J	0.0024		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	7/7	100%	N/A	0.0024	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-83/112	60145-20-2/744~	0.0000084		0.0012		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	13/14	93%	0.000004 – 0.000004	0.0012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-83/99	60145-20-2/383~	0.000065		0.018		mg/kg	SB407 (7/15/2021)	0 - 0.5	8/9	89%	0.000018 – 0.000018	0.018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-84	52663-60-2	0.0000027	J	0.0076		mg/kg	SB407 (7/15/2021)	0 - 0.5	16/16	100%	N/A	0.0076	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-84/92	52663-60-2/526~	0.000022		0.046		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-85/116	65510-45-4/182~	0.000011		0.012		mg/kg	SB407 (7/15/2021)	0 - 0.5	22/23	96%	0.000027 – 0.000027	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-85/116/117	TTNUS799	0.00016	J	0.0056		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	6/7	86%	0.004 – 0.004	0.0056	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-86	55312-69-1	0.0000036		0.0000036		mg/kg	SA-SB311 (11/7/2019)	0 - 0.5	1/14	7%	0.000002 – 0.000002	0.0000036	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-86/87/97/109/119/125	55312-69-1/383~	0.000084		0.031		mg/kg	SB407 (7/15/2021)	0 - 0.5	15/16	94%	0.000054 – 0.000054	0.031	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0 – 0.5 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-87/117/125	38380-02-8/681~	0.000017		0.048		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.048	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-88/91	55215-17-3/681~	0.0000016	J	0.0044		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	29/30	97%	0.0027 – 0.0027	0.0044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-89	73575-57-2	0.0000048		0.00045		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	11/30	37%	0.000002 – 0.0013	0.00045	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-9	34883-39-1	0.0000018	J	0.0011		mg/kg	SB407 (7/15/2021)	0 - 0.5	21/30	70%	0.000002 – 0.0013	0.0011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-90/101	68194-07-0/376~	0.000067		0.13		mg/kg	SB407 (7/15/2021)	0 - 0.5	9/9	100%	N/A	0.13	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-90/101/113	TTNUS619	0.0013	J	0.16		mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	7/7	100%	N/A	0.16	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-92	52663-61-3	0.000015		0.017		mg/kg	Multiple Locations	N/A	16/16	100%	N/A	0.017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-93	73575-56-1	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-93/100	73575-56-1/394~	0.0000039		0.0004	J	mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	5/7	71%	0.00043 – 0.0027	0.0004	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-93/95/98/100/102	73575-56-1/383~	0.00017		0.067		mg/kg	SB407 (7/15/2021)	0 - 0.5	8/9	89%	0.000045 – 0.000045	0.067	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-94	73575-55-0	0.00000056	J	0.00019	J	mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	18/30	60%	0.000002 – 0.0013	0.00019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-95	38379-99-6	0.000066		0.18		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	21/21	100%	N/A	0.18	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-96	73575-54-9	0.0000004	J	0.00026		mg/kg	SB407 (7/15/2021)	0 - 0.5	23/30	77%	0.000002 – 0.0013	0.00026	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-97	41464-51-1	0.000013		0.012		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	14/14	100%	N/A	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-98/102	60233-25-2/681~	0.000016		0.0012		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	6/21	29%	0.000004 – 0.0027	0.0012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-99	38380-01-7	0.000019		0.016		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	21/21	100%	N/A	0.016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCBC TEQ MAMMAL HALFND	CALC029P	8.32E-08		1.13E-04		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	30/30	100%	N/A	1.13E-04	MDC	N/A	4.80E-06	*	RSL	N/A	--	Yes	MDC > SL (CRQL N/A)
Total DiCB	25512-42-9	0.000024	J	0.076	J	mg/kg	SB407 (7/15/2021)	0 - 0.5	29/30	97%	0.00011 – 0.00011	0.076	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total HpCB	28655-71-2	0.00093	J	3.8	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	3.8	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total HxCB	26601-64-9	0.001	J	4	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	4	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total MoCB	27323-18-8	0.00001	J	0.0025	J	mg/kg	SB407 (7/15/2021)	0 - 0.5	27/30	90%	0 – 0.000027	0.0025	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total NoCB	53742-07-7	0.000023	J	0.054	J	mg/kg	SA-SB325 (11/22/2019)	0 - 0.5	30/30	100%	N/A	0.054	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total OcCB	55722-26-4	0.00023	J	0.81	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	0.81	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total PeCB	25429-29-2	0.00025	J	1.1	J	mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	1.1	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total TeCB	26914-33-0	0.000036	J	0.39	J	mg/kg	SB407 (7/15/2021)	0 - 0.5	30/30	100%	N/A	0.39	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total TrCB	25323-68-6	0.000012	J	0.32	J	mg/kg	SB407 (7/15/2021)	0 - 0.5	30/30	100%	N/A	0.32	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
TOTAL PCB HOMOLOGS HALFND	CALCHOMOL	0.00296238		9.82831		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	30/30	100%	N/A	9.82831	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Dioxins and Furans																					
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001-02-0	0.0000017	J	0.00077		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	24/24	100%	N/A	0.00077	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268-87-9	0.000059		0.0071	J	mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	24/24	100%	N/A	0.0071	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	0.00000085	J	0.00012		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	23/24	96%	0.0000023 – 0.0000023	0.00012	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	0.000003	J	0.00064		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	24/24	100%	N/A	0.00064	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	0.00000047	J	0.000015		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	19/24	79%	0.0000002 – 0.0000023	0.000015	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	0.0000011	J	0.00009		mg/kg	SA-SB321 (11/25/2019)	0 - 0.5	23/24	96%	0.00000024 – 0.00000024	0.00009	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	0.00000029	JZ	0.0000055		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	15/24	63%	0.00000031 – 0.0000015	0.0000055	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	0.00000055	J	0.000019		mg/kg	SA-SB311 (11/7/2019)	0 - 0.5	20/24	83%	0.0000003 – 0.0000019	0.000019	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	0.00000034	J	0.000016		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	20/24	83%	0.0000011 – 0.0000013	0.000016	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	0.00000033	J	0.000012		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	7/24	29%	0.00000021 – 0.0000015	0.000012	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	0.00000055	JZ	0.000011		mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	14/24	58%	0.00000032 – 0.0000024	0.000011	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	0.00000067	J	0.00021		mg/kg	SA-SB321 (11/25/2019)	0 - 0.5	17/24	71%	0.00000021 – 0.0000017	0.00021	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	0.00000034	J	0.0000042	Z	mg/kg	SA-SB324 (11/22/2019)	0 - 0.5	16/24	67%	0.00000018 – 0.0000019	0.0000042	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	0.00000068	J	0.000021		mg/kg	SA-SB311 (11/7/2019)	0 - 0.5	21/24	88%	0.00000029 – 0.00000099	0.000021	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	0.00000082	J	0.00026		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	21/24	88%	0.00000024 – 0.00000091	0.00026	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	0.0000002	J	0.000027		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	24/24	100%	N/A	0.000027	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	0.00000024	J	0.000001		mg/kg	SA-SB311 (11/7/2019)	0 - 0.5	11/24	46%	0.000000097 – 0.00000049	0.000001	MDC	N/A	See TEQ		N/A	0.0000052	WVDEP	No	TEQ used to evaluate chemical
DIOXIN TEQ MAMMAL HALFND	CALC029D	9.41E-07		9.00E-05		mg/kg	SA-SB366 (11/15/2019)	0 - 0.5	24/24	100%	N/A	9.00E-05	MDC	N/A	4.80E-06	*	RSL	N/A	--	Yes	MDC > SL (CRQL N/A)
Metals																					
Aluminum	7429-90-5	2260		15700		mg/kg	SA-SB319 (11/7/2019)	0 - 0.5	30/30	100%	N/A	15700	MDC	N/A	7700		RSL	77000	WVDEP	Yes	MDC > SL (CRQL N/A)
Antimony	7440-36-0	0.21	J	1.2		mg/kg	Multiple Locations	N/A	16/30	53%	1.1 – 8.2	1.2	MDC	N/A	3.1		RSL	31	WVDEP	No	MDC ≤ SL < CRQL
Arsenic	7440-38-2	1.9		14.6		mg/kg	SA-SB317 (11/8/2019)	0 - 0.5	30/30	100%	N/A	14.6	MDC	N/A	0.68		RSL	0.68	WVDEP	Yes	MDC > SL (CRQL N/A)
Barium	7440-39-3	37.1		222		mg/kg	SA-SB311 (11/7/2019)	0 - 0.5	30/30	100%	N/A	222	MDC	N/A	1500		RSL	15000	WVDEP	No	MDC ≤ SL (CRQL N/A)
Beryllium	7440-41-7	0.33	J	1.4		mg/kg	SA-SB317 (11/8/2019)	0 - 0.5	30/30	100%	N/A	1.4	MDC	N/A	16		RSL	160	WVDEP	No	MDC ≤ SL (CRQL N/A)
Cadmium	7440-43-9	0.1	J	0.5	J	mg/kg	SA-SB316 (11/8/2019)	0 - 0.5	26/30	87%	0.55 – 0.63	0.5	MDC	N/A	0.71		RSL	37	WVDEP	No	CRQL and MDC ≤ SL
Calcium	7440-70-2	776		23000		mg/kg	SB408 (7/16/2021)	0 - 0.5	29/30	97%	580 – 580	23000	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Chromium	7440-47-3	6.6		18		mg/kg	SB451 (7/15/2021)	0 - 0.5	30/30	100%	N/A	18	MDC	N/A	0.3	*	RSL	0.3	WVDEP	Yes	MDC > SL (CRQL N/A)

Table A-2.1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0 – 0.5 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
Cobalt	7440-48-4	2.9	J	23.6		mg/kg	SA-SB317 (11/8/2019)	0 - 0.5	30/30	100%	N/A	23.6	MDC	N/A	2.3		RSL	23	WVDEP	Yes	MDC > SL (CRQL N/A)
Copper	7440-50-8	3.7		129		mg/kg	SA-SB326 (11/15/2019)	0 - 0.5	30/30	100%	N/A	129	MDC	N/A	310		RSL	3100	WVDEP	No	MDC ≤ SL (CRQL N/A)
Iron	7439-89-6	5700		77700		mg/kg	SA-SB320 (11/25/2019)	0 - 0.5	30/30	100%	N/A	77700	MDC	N/A	5500		RSL	55000	WVDEP	Yes	MDC > SL (CRQL N/A)
Lead	7439-92-1	8.5		99.9		mg/kg	SA-SB319 (11/7/2019)	0 - 0.5	30/30	100%	N/A	99.9	MDC	N/A	400		RSL	400	WVDEP	No	MDC ≤ SL (CRQL N/A)
Magnesium	7439-95-4	549	J	4780		mg/kg	SA-SB320 (11/25/2019)	0 - 0.5	29/30	97%	580 – 580	4780	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Manganese	7439-96-5	50		1140		mg/kg	SA-SB322 (11/22/2019)	0 - 0.5	30/30	100%	N/A	1140	MDC	N/A	180		RSL	1800	WVDEP	Yes	MDC > SL (CRQL N/A)
Mercury	7439-97-6	0.018	J	0.12		mg/kg	SA-SB313 (11/7/2019)	0 - 0.5	19/30	63%	0.11 – 0.13	0.12	MDC	N/A	1.1	*	RSL	3.1	WVDEP	No	CRQL and MDC ≤ SL
Nickel	7440-02-0	4.5		28.1		mg/kg	SA-SB318 (11/8/2019)	0 - 0.5	30/30	100%	N/A	28.1	MDC	N/A	150		RSL	1500	WVDEP	No	MDC ≤ SL (CRQL N/A)
Potassium	7440-09-7	624		3400		mg/kg	SA-SB319 (11/7/2019)	0 - 0.5	27/30	90%	579 – 664	3400	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Selenium	7782-49-2	0.18	J	1.3	J	mg/kg	SA-SB319 (11/7/2019)	0 - 0.5	18/30	60%	2.8 – 4.8	1.3	MDC	N/A	39		RSL	390	WVDEP	No	CRQL and MDC ≤ SL
Silver	7440-22-4	0.053	J	0.19	J	mg/kg	SA-SB369 (11/21/2019)	0 - 0.5	9/30	30%	0.55 – 1.4	0.19	MDC	N/A	39		RSL	390	WVDEP	No	CRQL and MDC ≤ SL
Sodium	7440-23-5	8.5	J	172	J	mg/kg	SA-SB314 (11/7/2019)	0 - 0.5	14/30	47%	500 – 701	172	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Thallium	7440-28-0	0.046	J	0.25	J	mg/kg	SA-SB327 (11/15/2019)	0 - 0.5	10/30	33%	0.55 – 3.4	0.25	MDC	N/A	0.078		RSL	0.78	WVDEP	Yes	MDC > SL
Vanadium	7440-62-2	5		25		mg/kg	SB406 (7/15/2021)	0 - 0.5	30/30	100%	N/A	25	MDC	N/A	39	*	RSL	460	WVDEP	No	MDC ≤ SL (CRQL N/A)
Zinc	7440-66-6	9.1		161		mg/kg	SA-SB369 (11/21/2019)	0 - 0.5	30/30	100%	N/A	161	MDC	N/A	2300		RSL	23000	WVDEP	No	MDC ≤ SL (CRQL N/A)
Cyanide																					
Cyanide	57-12-5	0.013	J	0.47	J	mg/kg	SA-SB319 (11/7/2019)	0 - 0.5	12/15	80%	0.53 – 0.63	0.47	MDC	N/A	2.3		RSL	N/A	--	No	CRQL and MDC ≤ SL

Notes:
% = Percent
ARAR = Applicable or Relevant and Appropriate Requirements
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
CRQL = Contract Required Quantitation Limit
ft bgs = feet below gound surface
J = Estimated Concentration (+/- indicates a positive or negative bia, respectively)
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
TEQ = Toxicity Equivalence
USEPA = United States Environmental Protection Agency
WVDEP = West Virginia Department of Environmental Protection
(1) Site data screened against USEPA Residential Soil RSLs, last updated November 2021 (TR = 1E-6, THQ = 0.1).
(2) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see **Table 2-4**).
(3) As indicated in the WVDEP Voluntary Remediation Program technical guidance, residential soil "De Minimis" values pursuant to 60CSR9 (effective 12/2/2021) were selected as potential ARARs.

Table A-2.2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Near Surface Soil, 0.5 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0.5 – 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
Volatile Organic Compounds (VOCs)																					
1,1,1-Trichloroethane	71-55-6	0.0016	J	0.14	J	mg/kg	SA-SB323 (11/22/2019)	0.5 - 2	2/20	10%	0.0041 – 0.0096	0.14	MDC	N/A	810		RSL	640	WVDEP	No	CRQL and MDC ≤ SL
1,1,2,2-Tetrachloroethane	79-34-5	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.6		RSL	0.64	WVDEP	No	100% ND and CRQL ≤ SL
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	670		RSL	910	WVDEP	No	100% ND and CRQL ≤ SL
1,1,2-Trichloroethane	79-00-5	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.15		RSL	1.2	WVDEP	See Uncertainty	100% ND and CRQL > SL
1,1-Dichloroethane	75-34-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	3.6		RSL	3.8	WVDEP	No	100% ND and CRQL ≤ SL
1,1-Dichloroethene	75-35-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	23		RSL	240	WVDEP	No	100% ND and CRQL ≤ SL
1,2,3-Trichlorobenzene	87-61-6	N/A		N/A		mg/kg	N/A	N/A	0/15	0%	0.0041 – 0.44	0.44	CRQL	N/A	6.3		RSL	N/A	--	No	100% ND and CRQL ≤ SL
1,2,4-Trichlorobenzene	120-82-1	N/A		N/A		mg/kg	N/A	N/A	0/15	0%	0.0041 – 0.44	0.44	CRQL	N/A	5.8		RSL	24	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dibromo-3-chloropropane	96-12-8	N/A		N/A		mg/kg	N/A	N/A	0/15	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.0053		RSL	0.0057	WVDEP	See Uncertainty	100% ND and CRQL > SL
1,2-Dibromoethane	106-93-4	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.036		RSL	0.039	WVDEP	See Uncertainty	100% ND and CRQL > SL
1,2-Dichlorobenzene	95-50-1	N/A		N/A		mg/kg	N/A	N/A	0/15	0%	0.0041 – 0.44	0.44	CRQL	N/A	180		RSL	380	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dichloroethane	107-06-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.46		RSL	0.5	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dichloropropane	78-87-5	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	1.6		RSL	2.7	WVDEP	No	100% ND and CRQL ≤ SL
1,3-Dichlorobenzene	541-73-1	N/A		N/A		mg/kg	N/A	N/A	0/15	0%	0.0041 – 0.44	0.44	CRQL	N/A	180	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
1,4-Dichlorobenzene	106-46-7	N/A		N/A		mg/kg	N/A	N/A	0/15	0%	0.0041 – 0.44	0.44	CRQL	N/A	2.6		RSL	2.8	WVDEP	No	100% ND and CRQL ≤ SL
2-Butanone	78-93-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0083 – 0.88	0.88	CRQL	N/A	2700		RSL	28000	WVDEP	No	100% ND and CRQL ≤ SL
2-Hexanone	591-78-6	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0083 – 0.88	0.88	CRQL	N/A	20		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Methyl-2-pentanone	108-10-1	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0083 – 0.88	0.88	CRQL	N/A	3300		RSL	3400	WVDEP	No	100% ND and CRQL ≤ SL
Acetone	67-64-1	0.0045	J	0.026		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	8/21	38%	0.0093 – 0.88	0.026	MDC	N/A	7000		RSL	61000	WVDEP	No	CRQL and MDC ≤ SL
Benzene	71-43-2	0.00089	J	0.0038	J	mg/kg	SA-SB316 (11/8/2019)	0.5 - 2	2/20	10%	0.0041 – 0.44	0.0038	MDC	N/A	1.2		RSL	1.2	WVDEP	No	CRQL and MDC ≤ SL
Bromochloromethane	74-97-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	15		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Bromodichloromethane	75-27-4	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.29		RSL	0.31	WVDEP	See Uncertainty	100% ND and CRQL > SL
Bromoform	75-25-2	N/A		N/A		mg/kg	N/A	N/A	0/15	0%	0.0041 – 0.44	0.44	CRQL	N/A	19		RSL	20	WVDEP	No	100% ND and CRQL ≤ SL
Bromomethane	74-83-9	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.68		RSL	7.3	WVDEP	No	100% ND and CRQL ≤ SL
Carbon disulfide	75-15-0	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	77		RSL	740	WVDEP	No	100% ND and CRQL ≤ SL
Carbon tetrachloride	56-23-5	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.65		RSL	0.7	WVDEP	No	100% ND and CRQL ≤ SL
Chlorobenzene	108-90-7	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	28		RSL	290	WVDEP	No	100% ND and CRQL ≤ SL
Chloroethane	75-00-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	540		RSL	2100	WVDEP	No	100% ND and CRQL ≤ SL
Chloroform	67-66-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.32		RSL	0.34	WVDEP	See Uncertainty	100% ND and CRQL > SL
Chloromethane	74-87-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	11		RSL	120	WVDEP	No	100% ND and CRQL ≤ SL
cis-1,2-Dichloroethene	156-59-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	16		RSL	17	WVDEP	No	100% ND and CRQL ≤ SL
cis-1,3-Dichloropropene	10061-01-5	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	1.8	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Cyclohexane	110-82-7	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	650		RSL	120	WVDEP	No	100% ND and CRQL ≤ SL
Dibromochloromethane	124-48-1	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	8.3		RSL	8.3	WVDEP	No	100% ND and CRQL ≤ SL
Dichlorodifluoromethane	75-71-8	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	8.7		RSL	94	WVDEP	No	100% ND and CRQL ≤ SL
Ethylbenzene	100-41-4	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	5.8		RSL	6.2	WVDEP	No	100% ND and CRQL ≤ SL
Isopropylbenzene	98-82-8	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	190		RSL	270	WVDEP	No	100% ND and CRQL ≤ SL
m,p-Xylene	179601-23-1	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	58	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Methyl acetate	79-20-9	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	7800		RSL	23000	WVDEP	No	100% ND and CRQL ≤ SL
Methyl tert-butyl ether	1634-04-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	47		RSL	50	WVDEP	No	100% ND and CRQL ≤ SL
Methylcyclohexane	108-87-2	0.0013	J	0.13	J	mg/kg	SA-SB323 (11/22/2019)	0.5 - 2	4/20	20%	0.0041 – 0.0096	0.13	MDC	N/A	650	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Methylene chloride	75-09-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	35		RSL	58	WVDEP	No	100% ND and CRQL ≤ SL
o-Xylene	95-47-6	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	64		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Styrene	100-42-5	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	600		RSL	870	WVDEP	No	100% ND and CRQL ≤ SL
Tetrachloroethene	127-18-4	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	8.1		RSL	25	WVDEP	No	100% ND and CRQL ≤ SL
Toluene	108-88-3	0.0015	J	0.0064	J	mg/kg	SA-SB316 (11/8/2019)	0.5 - 2	2/20	10%	0.0041 – 0.44	0.0064	MDC	N/A	490		RSL	820	WVDEP	No	CRQL and MDC ≤ SL
trans-1,2-Dichloroethene	156-60-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	7		RSL	75	WVDEP	No	100% ND and CRQL ≤ SL
trans-1,3-Dichloropropene	10061-02-6	N/A		N/A		mg/kg	N/A	N/A	0/20	0%	0.0041 – 0.44	0.44	CRQL	N/A	1.8	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Trichloroethene	79-01-6	N/A		N/A		mg/kg	N/A	N/A	0/11	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.41		RSL	1	WVDEP	See Uncertainty	100% ND and CRQL > SL
Trichlorofluoromethane	75-69-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	2300		RSL	790	WVDEP	No	100% ND and CRQL ≤ SL
Vinyl chloride	75-01-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0041 – 0.44	0.44	CRQL	N/A	0.059		RSL	0.061	WVDEP	See Uncertainty	100% ND and CRQL > SL
Semi-Volatile Organic Compounds (SVOCs)																					
1,1'-Biphenyl	92-52-4	0.014	J	0.2		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	8/30	27%	0.19 – 0.21	0.2	MDC	N/A	4.7		RSL	51	WVDEP	No	CRQL and MDC ≤ SL
1,2,4,5-Tetrachlorobenzene	95-94-3	0.062	J	0.062	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	1/30	3%	0.19 – 0.21	0.062	MDC	N/A	0.23		RSL	17	WVDEP	No	CRQL and MDC ≤ SL

Table A-2.2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Near Surface Soil, 0.5 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0.5 – 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
1,4-Dioxane	123-91-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.073 – 0.083	0.083	CRQL	N/A	5.3		RSL	5.4	WVDEP	No	100% ND and CRQL ≤ SL
2,2'-Oxybis(1-chloropropane)	108-60-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	310		RSL	5.1	WVDEP	No	100% ND and CRQL ≤ SL
2,3,4,6-Tetrachlorophenol	58-90-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	190		RSL	1900	WVDEP	No	100% ND and CRQL ≤ SL
2,4,5-Trichlorophenol	95-95-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	630		RSL	6300	WVDEP	No	100% ND and CRQL ≤ SL
2,4,6-Trichlorophenol	88-06-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	6.3		RSL	49	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dichlorophenol	120-83-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	19		RSL	190	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dimethylphenol	105-67-9	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	130		RSL	1300	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dinitrophenol	51-28-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	13		RSL	130	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dinitrotoluene	121-14-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	1.7		RSL	1.7	WVDEP	No	100% ND and CRQL ≤ SL
2,6-Dinitrotoluene	606-20-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	0.36		RSL	0.36	WVDEP	No	100% ND and CRQL ≤ SL
2-Chloronaphthalene	91-58-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	480		RSL	5000	WVDEP	No	100% ND and CRQL ≤ SL
2-Chlorophenol	95-57-8	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	39		RSL	340	WVDEP	No	100% ND and CRQL ≤ SL
2-Methylnaphthalene	91-57-6	0.0049		0.48		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	27/30	90%	0.0037 – 0.19	0.48	MDC	N/A	24		RSL	310	WVDEP	No	CRQL and MDC ≤ SL
2-Methylphenol	95-48-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	320		RSL	3200	WVDEP	No	100% ND and CRQL ≤ SL
2-Nitroaniline	88-74-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	63		RSL	630	WVDEP	No	100% ND and CRQL ≤ SL
2-Nitrophenol	88-75-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	1900	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
3 & 4 Methylphenol	15831-10-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.36 – 0.41	0.41	CRQL	N/A	630	*	RSL	3200	WVDEP	No	100% ND and CRQL ≤ SL
3,3'-Dichlorobenzidine	91-94-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	1.2		RSL	1.2	WVDEP	No	100% ND and CRQL ≤ SL
3-Nitroaniline	99-09-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	63	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
4,6-Dinitro-2-methylphenol	534-52-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	0.51		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Bromophenyl-phenylether	101-55-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
4-Chloro-3-methylphenol	59-50-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	630		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Chloroaniline	106-47-8	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	2.7		RSL	2.7	WVDEP	No	100% ND and CRQL ≤ SL
4-Chlorophenyl-phenylether	7005-72-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
4-Methylphenol	106-44-5	N/A		N/A		mg/kg	N/A	N/A	0/9	0%	0.36 – 0.41	0.41	CRQL	N/A	130		RSL	6300	WVDEP	No	100% ND and CRQL ≤ SL
4-Nitroaniline	100-01-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	25		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Nitrophenol	100-02-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	1900	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Acenaphthene	83-32-9	0.00087	J	2.4		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	25/30	83%	0.0037 – 0.19	2.4	MDC	N/A	360		RSL	4100	WVDEP	No	CRQL and MDC ≤ SL
Acenaphthylene	208-96-8	0.0013	J	0.86		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	27/30	90%	0.0037 – 0.19	0.86	MDC	N/A	See Rationale		N/A	4200	WVDEP	See Uncertainty	No SL or surrogate toxicity available
Acetophenone	98-86-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	780		RSL	2500	WVDEP	No	100% ND and CRQL ≤ SL
Anthracene	120-12-7	0.0018	J	0.81		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	27/30	90%	0.0037 – 0.19	0.81	MDC	N/A	1800		RSL	23000	WVDEP	No	CRQL and MDC ≤ SL
Atrazine	1912-24-9	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	2.4		RSL	2.4	WVDEP	No	100% ND and CRQL ≤ SL
Benzaldehyde	100-52-7	0.035	J	0.035	J	mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	1/30	3%	0.36 – 0.41	0.035	MDC	N/A	170		RSL	170	WVDEP	No	CRQL and MDC ≤ SL
Benzo(a)anthracene	56-55-3	0.0016	J	3.9		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	3.9	MDC	N/A	1.1		RSL	1.5	WVDEP	**Yes**	MDC > SL
Benzo(a)pyrene	50-32-8	0.0012	J	3.3		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	3.3	MDC	N/A	0.11		RSL	0.11	WVDEP	**Yes**	MDC > SL
Benzo(b)fluoranthene	205-99-2	0.0023	J	5.7		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	5.7	MDC	N/A	1.1		RSL	1.1	WVDEP	**Yes**	MDC > SL
Benzo(g,h,i)perylene	191-24-2	0.00087	J	1.2		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	1.2	MDC	N/A	See Rationale		N/A	1800	WVDEP	See Uncertainty	No SL or surrogate toxicity available
Benzo(k)fluoranthene	207-08-9	0.00083	J	1.8		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	1.8	MDC	N/A	11		RSL	11	WVDEP	No	CRQL and MDC ≤ SL
Bis(2-chloroethoxy)methane	111-91-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	19		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Bis(2-chloroethyl)ether	111-44-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	0.23		RSL	0.24	WVDEP	See Uncertainty	100% ND and CRQL > SL
Bis(2-ethylhexyl)phthalate	117-81-7	0.02	J	0.13	J	mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	6/30	20%	0.19 – 0.21	0.13	MDC	N/A	39		RSL	39	WVDEP	No	CRQL and MDC ≤ SL
Butylbenzylphthalate	85-68-7	0.045	J	0.045	J	mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	1/30	3%	0.19 – 0.21	0.045	MDC	N/A	290		RSL	290	WVDEP	No	CRQL and MDC ≤ SL
Caprolactam	105-60-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	3100		RSL	31000	WVDEP	No	100% ND and CRQL ≤ SL
Carbazole	86-74-8	0.025	J	0.24	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	4/30	13%	0.36 – 0.41	0.24	MDC	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
Chrysene	218-01-9	0.0018	J	2.4		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	2.4	MDC	N/A	110		RSL	110	WVDEP	No	CRQL and MDC ≤ SL
Dibenz(a,h)anthracene	53-70-3	0.0012	J	0.055	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	14/30	47%	0.0037 – 0.21	0.055	MDC	N/A	0.11		RSL	0.11	WVDEP	No	MDC ≤ SL < CRQL
Dibenzofuran	132-64-9	0.02	J	0.98		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	9/30	30%	0.19 – 0.21	0.98	MDC	N/A	7.8		RSL	78	WVDEP	No	CRQL and MDC ≤ SL
Diethylphthalate	84-66-2	0.024	J	0.024	J	mg/kg	SA-SB315 (11/7/2019)	0.5 - 2	1/30	3%	0.19 – 0.21	0.024	MDC	N/A	5100		RSL	51000	WVDEP	No	CRQL and MDC ≤ SL
Dimethylphthalate	131-11-3	0.19	J	0.52		mg/kg	SA-SB322 (11/22/2019)	0.5 - 2	7/30	23%	0.19 – 0.21	0.52	MDC	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
Di-N-Butylphthalate	84-74-2	0.019	J	0.032	J	mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	3/30	10%	0.19 – 0.21	0.032	MDC	N/A	630		RSL	6300	WVDEP	No	CRQL and MDC ≤ SL
Di-N-Octyl Phthalate	117-84-0	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	63		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Fluoranthene	206-44-0	0.0023	J	6.6		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	6.6	MDC	N/A	240		RSL	2400	WVDEP	No	CRQL and MDC ≤ SL
Fluorene	86-73-7	0.0013	J	3.5		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	25/30	83%	0.0037 – 0.19	3.5	MDC	N/A	240		RSL	2900	WVDEP	No	CRQL and MDC ≤ SL
Hexachlorobenzene	118-74-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	0.078		RSL	0.22	WVDEP	See Uncertainty	100% ND and CRQL > SL
Hexachlorobutadiene	87-68-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	1.2		RSL	1.3	WVDEP	No	100% ND and CRQL ≤ SL

Table A-2.2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Near Surface Soil, 0.5 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0.5 – 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
Hexachlorocyclopentadiene	77-47-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.36 – 0.41	0.41	CRQL	N/A	0.18		RSL	1.9	WVDEP	See Uncertainty	100% ND and CRQL > SL
Hexachloroethane	67-72-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	1.8		RSL	2	WVDEP	No	100% ND and CRQL ≤ SL
Indeno(1,2,3-cd)pyrene	193-39-5	0.00081	J	1.5		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	1.5	MDC	N/A	1.1		RSL	1.1	WVDEP	Yes	MDC > SL
Isophorone	78-59-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	570		RSL	570	WVDEP	No	100% ND and CRQL ≤ SL
Naphthalene	91-20-3	0.0034	J	0.99		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	26/30	87%	0.0037 – 0.19	0.99	MDC	N/A	2		RSL	2.4	WVDEP	No	CRQL and MDC ≤ SL
Naphthalene, 1-methyl-	90-12-0	0.0039	J	0.1		mg/kg	SB408 (7/16/2021)	0.5 - 2	7/9	78%	0.0037 – 0.0039	0.1	MDC	N/A	18		RSL	24	WVDEP	No	CRQL and MDC ≤ SL
Nitrobenzene	98-95-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	5.1		RSL	5.5	WVDEP	No	100% ND and CRQL ≤ SL
N-Nitroso-di-n-propylamine (NDPA)	621-64-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	0.078		RSL	0.078	WVDEP	See Uncertainty	100% ND and CRQL > SL
N-Nitrosodiphenylamine	86-30-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.21	0.21	CRQL	N/A	110		RSL	110	WVDEP	No	100% ND and CRQL ≤ SL
Pentachlorophenol	87-86-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0074 – 0.41	0.41	CRQL	N/A	1		RSL	1	WVDEP	No	100% ND and CRQL ≤ SL
Phenanthrene	85-01-8	0.0013	J	2		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	2	MDC	N/A	See Rationale		N/A	23000	WVDEP	See Uncertainty	No SL or surrogate toxicity available
Phenol	108-95-2	0.041	J	0.072	J	mg/kg	SA-SB369 (11/21/2019)	0.5 - 2	6/30	20%	0.36 – 0.41	0.072	MDC	N/A	1900		RSL	19000	WVDEP	No	CRQL and MDC ≤ SL
Pyrene	129-00-0	0.0025	J	6.9		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	28/30	93%	0.0037 – 0.0039	6.9	MDC	N/A	180		RSL	2300	WVDEP	No	CRQL and MDC ≤ SL
Pesticides																					
4,4'-DDD	72-54-8	0.00042	J	0.0093	J	mg/kg	SA-SB321 (11/25/2019)	0.5 - 2	8/26	31%	0.0036 – 0.0043	0.0093	MDC	N/A	0.19		RSL	1.9	WVDEP	No	CRQL and MDC ≤ SL
4,4'-DDE	72-55-9	0.00028	J	0.0044		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	5/28	18%	0.0036 – 0.0043	0.0044	MDC	N/A	2		RSL	2	WVDEP	No	CRQL and MDC ≤ SL
4,4'-DDT	50-29-3	0.0004	J	0.13	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	4/30	13%	0.0036 – 0.0043	0.13	MDC	N/A	1.9		RSL	1.9	WVDEP	No	CRQL and MDC ≤ SL
Aldrin	309-00-2	0.00022	J	0.00073	J	mg/kg	SB404 (7/16/2021)	0.5 - 2	2/30	7%	0.0019 – 0.0022	0.00073	MDC	N/A	0.039		RSL	0.039	WVDEP	No	CRQL and MDC ≤ SL
alpha-BHC	319-84-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0019 – 0.0022	0.0022	CRQL	N/A	0.086		RSL	0.086	WVDEP	No	100% ND and CRQL ≤ SL
beta-BHC	319-85-7	0.00025	J	0.00054	J	mg/kg	SA-SB326 (11/15/2019)	0.5 - 2	3/29	10%	0.0019 – 0.0022	0.00054	MDC	N/A	0.3		RSL	0.3	WVDEP	No	CRQL and MDC ≤ SL
cis-Chlordane	5103-71-9	0.00052	J	0.0016	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	5/30	17%	0.0019 – 0.0022	0.0016	MDC	N/A	3.6		RSL	N/A	--	No	CRQL and MDC ≤ SL
delta-BHC	319-86-8	0.00024	J	0.0015	J	mg/kg	SB408 (7/16/2021)	0.5 - 2	3/30	10%	0.0019 – 0.0022	0.0015	MDC	N/A	0.086	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Dieldrin	60-57-1	0.00052	J	0.022	J	mg/kg	SB408 (7/16/2021)	0.5 - 2	7/28	25%	0.0036 – 0.0043	0.022	MDC	N/A	0.034		RSL	0.042	WVDEP	No	CRQL and MDC ≤ SL
Endosulfan I	959-98-8	0.00034	J	0.00083	J	mg/kg	SA-SB326 (11/15/2019)	0.5 - 2	4/30	13%	0.0019 – 0.0022	0.00083	MDC	N/A	47	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Endosulfan II	33213-65-9	0.00028	J	0.02	J	mg/kg	SB408 (7/16/2021)	0.5 - 2	10/30	33%	0.0036 – 0.0043	0.02	MDC	N/A	47	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Endosulfan Sulfate	1031-07-8	0.00083	J	0.0013	J	mg/kg	SB406 (7/15/2021)	0.5 - 2	4/30	13%	0.0036 – 0.0043	0.0013	MDC	N/A	38		RSL	N/A	--	No	CRQL and MDC ≤ SL
Endrin	72-20-8	0.00031	J	0.021	J	mg/kg	SB408 (7/16/2021)	0.5 - 2	12/29	41%	0.0036 – 0.0043	0.021	MDC	N/A	1.9		RSL	19	WVDEP	No	CRQL and MDC ≤ SL
Endrin Aldehyde	7421-93-4	0.001	J	0.0025	J	mg/kg	SA-SB328 (11/15/2019)	0.5 - 2	3/30	10%	0.0036 – 0.0043	0.0025	MDC	N/A	1.9	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Endrin Ketone	53494-70-5	0.0029	J	0.003	J	mg/kg	SA-SB326 (11/15/2019)	0.5 - 2	2/30	7%	0.0036 – 0.039	0.003	MDC	N/A	1.9	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
gamma-BHC (Lindane)	58-89-9	0.00042	J	0.012	J	mg/kg	SA-SB321 (11/25/2019)	0.5 - 2	16/28	57%	0.0019 – 0.0021	0.012	MDC	N/A	0.071		RSL	0.57	WVDEP	No	CRQL and MDC ≤ SL
Heptachlor	76-44-8	0.00037	J	0.00048	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	3/30	10%	0.0019 – 0.0022	0.00048	MDC	N/A	0.13		RSL	0.14	WVDEP	No	CRQL and MDC ≤ SL
Heptachlor Epoxide	1024-57-3	0.00026	J	0.00087	J	mg/kg	SA-SB328 (11/15/2019)	0.5 - 2	3/30	10%	0.0019 – 0.0022	0.00087	MDC	N/A	0.07		RSL	0.071	WVDEP	No	CRQL and MDC ≤ SL
Methoxychlor	72-43-5	0.0068	J	0.028	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	4/30	13%	0.019 – 0.022	0.028	MDC	N/A	32		RSL	320	WVDEP	No	CRQL and MDC ≤ SL
Toxaphene	8001-35-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.19 – 0.22	0.22	CRQL	N/A	0.49		RSL	0.49	WVDEP	No	100% ND and CRQL ≤ SL
trans-Chlordane	5103-74-2	0.0051		0.039	J	mg/kg	SB408 (7/16/2021)	0.5 - 2	3/27	11%	0.0019 – 0.0022	0.039	MDC	N/A	3.6		RSL	N/A	--	No	CRQL and MDC ≤ SL
Polychlorinated Biphenyls (PCBs)																					
Aroclor 1016	12674-11-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.269 – 0.352	0.352	CRQL	N/A	0.41		RSL	5.5	WVDEP	No	100% ND and CRQL ≤ SL
Aroclor 1221	11104-28-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.538 – 0.704	0.704	CRQL	N/A	0.2		RSL	0.26	WVDEP	See Uncertainty	100% ND and CRQL > SL
Aroclor 1232	11141-16-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.269 – 0.352	0.352	CRQL	N/A	0.17		RSL	0.22	WVDEP	See Uncertainty	100% ND and CRQL > SL
Aroclor 1242	53469-21-9	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.269 – 0.352	0.352	CRQL	N/A	0.23		RSL	0.31	WVDEP	See Uncertainty	100% ND and CRQL > SL
Aroclor 1248	12672-29-6	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.269 – 0.352	0.352	CRQL	N/A	0.23		RSL	0.31	WVDEP	See Uncertainty	100% ND and CRQL > SL
Aroclor 1254	11097-69-1	0.053	J+	0.551		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	2/21	10%	0.269 – 0.333	0.551	MDC	N/A	0.12		RSL	0.32	WVDEP	Yes	MDC > SL
Aroclor 1260	11096-82-5	0.082	J	24	C	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	15/21	71%	0.272 – 0.352	24	MDC	N/A	0.24		RSL	0.33	WVDEP	Yes	MDC > SL
Aroclor 1262	37324-23-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.269 – 0.352	0.352	CRQL	N/A	0.23	*	RSL	N/A	--	See Uncertainty	100% ND and CRQL > SL
Aroclor 1268	11100-14-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.269 – 0.352	0.352	CRQL	N/A	0.23	*	RSL	N/A	--	See Uncertainty	100% ND and CRQL > SL
TOTAL AROCLOR HALFND	CALC021	1.333		24.144		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	21/21	100%	N/A	24.144	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
PCBs - Congeners																					
PCB-1	2051-60-7	0.0000021		0.0021		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	24/30	80%	0.000002 – 0.0012	0.0021	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-10	33146-45-1	0.00000075	J	0.000062		mg/kg	SB407 (7/15/2021)	0.5 - 2	14/30	47%	0.000002 – 0.0012	0.000062	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-100	39485-83-1	0.0000012	J	0.0002		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	10/14	71%	0.000002 – 0.000002	0.0002	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-101/90	PCB101/90	0.000044		0.08	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.08	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-103	60145-21-3	0.0000015	J	0.0077		mg/kg	SB408 (7/16/2021)	0.5 - 2	23/30	77%	0.000002 – 0.0012	0.0077	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-104	56558-16-8	0.0000031	J	0.00003		mg/kg	SB404 (7/16/2021)	0.5 - 2	3/30	10%	0.000002 – 0.0012	0.00003	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-105	32598-14-4	0.0000097		0.036		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	28/30	93%	0.000004 – 0.0000042	0.036	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-106	70424-69-0	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Near Surface Soil, 0.5 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0.5 – 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-107	70424-68-9	0.000047		0.0039		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	7/7	100%	N/A	0.0039	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-107/108	70424-68-9/703~	0.0000016	J	0.0014		mg/kg	Multiple Locations	N/A	14/14	100%	N/A	0.0014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-107/124	70424-68-9/704~	0.00000042	J	0.0036		mg/kg	SB408 (7/16/2021)	0.5 - 2	7/9	78%	0.000018 – 0.000019	0.0036	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-108/124	70362-41-3/704~	0.000032	J	0.0032		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	6/7	86%	0.0005 – 0.0005	0.0032	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-109	74472-35-8	0.00000043	J	0.0086		mg/kg	SB408 (7/16/2021)	0.5 - 2	8/23	35%	0.000002 – 0.000009	0.0086	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-11	2050-67-1	0.0000042		0.00016		mg/kg	SB407 (7/15/2021)	0.5 - 2	16/30	53%	0.000002 – 0.0012	0.00016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-110	38380-03-9	0.000037		0.041	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.041	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-110/115	38380-03-9/744~	0.00051		0.32		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	14/16	88%	0.000018 – 0.000019	0.32	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-111	39635-32-0	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-111/115	39635-32-0/744~	0.00000095	J	0.00043		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.00043	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-112	74472-36-9	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-113	68194-10-5	0.028		0.028		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	1/14	7%	0.000002 – 0.000002	0.028	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-114	74472-37-0	0.0000034		0.0021		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	25/30	83%	0.00000097 – 0.00025	0.0021	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-118	31508-00-6	0.0000076	J	0.14		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	15/16	94%	0.0000042 – 0.0000042	0.14	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-118/106	31508-00-6/704~	0.000025		0.029		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.029	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-119	56558-17-9	0.000005		0.0015		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	13/14	93%	0.000002 – 0.000002	0.0015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-12	2974-92-7	0.0000014	J	0.000028		mg/kg	SA-SB316 (11/8/2019)	0.5 - 2	13/14	93%	0.000002 – 0.000002	0.000028	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-12/13	2974-92-7/2974~	0.000011		0.00058		mg/kg	SB407 (7/15/2021)	0.5 - 2	4/16	25%	0.0000039 – 0.0024	0.00058	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-120	68194-12-7	0.0000011	J	0.0014		mg/kg	SB408 (7/16/2021)	0.5 - 2	19/30	63%	0.000002 – 0.0012	0.0014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-121	56558-18-0	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-122	76842-07-4	0.0000013	J	0.00025		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	17/30	57%	0.000002 – 0.0012	0.00025	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-123	65510-44-3	0.0000031		0.002		mg/kg	SB407 (7/15/2021)	0.5 - 2	25/30	83%	0.000001 – 0.00025	0.002	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-124	70424-70-3	0.0000012	J	0.0019		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.0019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-126	57465-28-8	0.0000032		0.00075		mg/kg	SB408 (7/16/2021)	0.5 - 2	22/30	73%	0.00000095 – 0.00055	0.00075	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-127	39635-33-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-128/162	38380-07-3/396~	0.000011		0.011		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-128/166	38380-07-3/414~	0.00023		0.1		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	14/16	88%	0.000018 – 0.000019	0.1	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-129	55215-18-4	0.0000025		0.0028		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.0028	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-129/138/163	55215-18-4/350~	0.00008		2.5		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	2.5	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-13	2974-90-5	0.0000012	J	0.000067		mg/kg	SA-SB328 (11/15/2019)	0.5 - 2	13/14	93%	0.000002 – 0.000002	0.000067	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-130	52663-66-8	0.0000027	J	0.056		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	29/30	97%	0.000009 – 0.000009	0.056	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-131	61798-70-7	0.000013		0.012		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	12/16	75%	0.000009 – 0.0012	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-131/133	61798-70-7/356~	0.0000023	J	0.0049		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.0049	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-132	38380-05-1	0.000012		0.67		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.67	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-132/161	38380-05-1/744~	0.000049		0.057	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.057	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-133	35694-04-3	0.0000015	J	0.022		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	13/16	81%	0.000009 – 0.0000096	0.022	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-134	52704-70-8	0.0003		0.098		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	7/7	100%	N/A	0.098	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-134/143	52704-70-8/681~	0.0000017	J	0.054		mg/kg	SB408 (7/16/2021)	0.5 - 2	22/23	96%	0.000018 – 0.000018	0.054	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-135	52744-13-5	0.000013		0.03	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.03	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-135/151	52744-13-5/526~	0.000024	J	1.3		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	1.3	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-136	38411-22-2	0.000011		0.41		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	28/30	93%	0.000009 – 0.0000096	0.41	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-137	35694-06-5	0.0000025		0.047		mg/kg	SB407 (7/15/2021)	0.5 - 2	24/30	80%	0.000009 – 0.000018	0.047	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-138/163/164	35065-28-2/744~	0.00016		0.17	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.17	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-139/140	56030-56-9/592~	0.0000091	J	0.0057		mg/kg	SB408 (7/16/2021)	0.5 - 2	11/16	69%	0.0000039 – 0.0024	0.0057	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-139/149	56030-56-9/383~	0.0001		0.18	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.18	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-14	34883-41-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-140	59291-64-4	0.0000047		0.0015		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	6/14	43%	0.000002 – 0.000002	0.0015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-141	52712-04-6	0.000014		0.7		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.7	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-142	41411-61-4	0.0000047		0.0000047		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	1/30	3%	0.000002 – 0.0012	0.0000047	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-143	68194-15-0	N/A		N/A		mg/kg	N/A	N/A	0/7	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-144	68194-14-9	0.0000031	J	0.17		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	29/30	97%	0.000009 – 0.000009	0.17	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-145	74472-40-5	0.0000037		0.0000098		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	5/30	17%	0.000002 – 0.0012	0.0000098	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-146	51908-16-8	0.000013		0.3		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.3	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-146/165	51908-16-8/744~	0.000021		0.037		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.037	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-147	68194-13-8	0.0000046		0.00049		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	13/14	93%	0.000002 – 0.000002	0.00049	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Near Surface Soil, 0.5 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0.5 – 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-147/149	68194-13-8/383~	0.000059		1.9		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	1.9	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-148	74472-41-6	0.0000013	J	0.0016		mg/kg	SB408 (7/16/2021)	0.5 - 2	6/30	20%	0.000002 – 0.0012	0.0016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-15	2050-68-2	0.0000029		0.007		mg/kg	SB408 (7/16/2021)	0.5 - 2	26/30	87%	0.000009 – 0.0012	0.007	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-150	68194-08-1	0.0000008	J	0.0013		mg/kg	SB408 (7/16/2021)	0.5 - 2	18/30	60%	0.000002 – 0.0012	0.0013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-151	52663-63-5	0.000035		0.08	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.08	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-152	68194-09-2	0.00000083	J	0.00045		mg/kg	SB408 (7/16/2021)	0.5 - 2	14/30	47%	0.000002 – 0.0012	0.00045	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-153	35065-27-1	0.00014		0.22	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.22	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-153/168	35065-27-1/592~	0.000095		2.8		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	2.8	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-154	60145-22-4	0.000005		0.0038		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	18/21	86%	0.000002 – 0.0012	0.0038	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-155	33979-03-2	0.000029		0.000029		mg/kg	SB404 (7/16/2021)	0.5 - 2	1/30	3%	0.000002 – 0.0012	0.000029	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-156	38380-08-4	0.00001		0.011		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.011	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-156/157	38380-08-4/697~	0.00018		0.12		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	14/16	88%	0.0000069 – 0.0000073	0.12	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-157	69782-90-7	0.0000016	J	0.00086		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.00086	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-158	74472-42-7	0.0000041	J	0.19		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.19	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-158/160	74472-42-7/414~	0.0000098		0.017		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-159	39635-35-3	0.0000012	J	0.031		mg/kg	SB408 (7/16/2021)	0.5 - 2	23/30	77%	0.000002 – 0.0012	0.031	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-16	38444-78-9	0.000011		0.0044		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	26/30	87%	0.000002 – 0.0012	0.0044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-160	41411-62-5	N/A		N/A		mg/kg	N/A	N/A	0/7	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-161	74472-43-8	0.000012		0.01		mg/kg	SB450 (7/15/2021)	0.5 - 2	2/16	13%	0.000002 – 0.0012	0.01	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-162	39635-34-2	0.0000051	J	0.0037		mg/kg	SB407 (7/15/2021)	0.5 - 2	7/16	44%	0.000002 – 0.0011	0.0037	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-164	74472-45-0	0.0000042	J	0.16		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	15/16	94%	0.000015 – 0.000015	0.16	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-165	74472-46-1	0.0000043	J	0.0081		mg/kg	SB408 (7/16/2021)	0.5 - 2	4/16	25%	0.000002 – 0.0012	0.0081	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-166	41411-63-6	0.0000022		0.00021		mg/kg	SA-SB316 (11/8/2019)	0.5 - 2	12/14	86%	0.000002 – 0.000002	0.00021	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-167	52663-72-6	0.0000056		0.041		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	28/30	93%	0.0000039 – 0.0000041	0.041	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-168	59291-65-5	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-169	32774-16-6	0.0000036		0.00052	Z	mg/kg	SA-SB323 (11/22/2019)	0.5 - 2	11/30	37%	0.00000078 – 0.00041	0.00052	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-17	37680-66-3	0.000011		0.0053		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	27/30	90%	0.000002 – 0.0000096	0.0053	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-170	35065-30-6	0.000026		1.1		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	1.1	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-171	52663-71-5	0.000023		0.032	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.032	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-171/173	52663-71-5/681~	0.0000077	J	0.35		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.35	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-172	52663-74-8	0.0000048	J	0.21		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.21	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-173	68194-16-1	0.0000017	J	0.0022		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.0022	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-174	38411-25-5	0.00003		1.4		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	1.4	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-175	40186-70-7	0.00000098	J	0.055		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	27/30	90%	0.000002 – 0.0000096	0.055	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-176	52663-65-7	0.0000026	J	0.18		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.18	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-177	52663-70-4	0.000022		0.75		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.75	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-178	52663-67-9	0.000011		0.28		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	29/30	97%	0.0000096 – 0.0000096	0.28	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-179	52663-64-6	0.000013		0.61		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.61	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-18	37680-65-2	0.0000023		0.0021		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.0021	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-18/30	37680-65-2/356~	0.00000046	J	0.011		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	15/16	94%	0.000019 – 0.000019	0.011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-180	35065-29-3	0.00024		0.19	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.19	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-180/193	35065-29-3/697~	0.000066		3		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	3	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-181	74472-47-2	0.0000083		0.00039		mg/kg	SB407 (7/15/2021)	0.5 - 2	6/30	20%	0.000002 – 0.0012	0.00039	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-182	60145-23-5	0.0000012	J	0.00014		mg/kg	SB407 (7/15/2021)	0.5 - 2	5/16	31%	0.000009 – 0.0012	0.00014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-182/187	60145-23-5/526~	0.00012		0.15	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.15	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-183	52663-69-1	0.000048		0.067	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.067	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-183/185	52663-69-1/527~	0.00002		0.88		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	15/16	94%	0.000019 – 0.000019	0.88	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-184	74472-48-3	0.00000073	J	0.000062		mg/kg	SB408 (7/16/2021)	0.5 - 2	8/30	27%	0.000002 – 0.0012	0.000062	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-185	52712-05-7	0.0000097		0.012		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-186	74472-49-4	0.00000091	J	0.00000091	J	mg/kg	SA-SB324 (11/22/2019)	0.5 - 2	1/30	3%	0.000002 – 0.0012	0.00000091	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-187	52663-68-0	0.000047		1.6		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	1.6	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-188	74487-85-7	0.00000074	J	0.0003		mg/kg	SB408 (7/16/2021)	0.5 - 2	13/30	43%	0.000002 – 0.0012	0.0003	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-189	39635-31-9	0.0000033		0.036		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	28/30	93%	0.0000041 – 0.0000043	0.036	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-19	38444-73-4	0.0000042		0.0014		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	24/30	80%	0.000002 – 0.0012	0.0014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-190	41411-64-7	0.0000078	J	0.25		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.25	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Near Surface Soil, 0.5 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0.5 – 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-191	74472-50-7	0.00000085	J	0.044		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	28/30	93%	0.000009 – 0.0012	0.044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-192	74472-51-8	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-193	69782-91-8	0.000011		0.013		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-194	35694-08-7	0.000015		0.62		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.62	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-195	52663-78-2	0.0000098		0.26		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.26	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-196	42740-50-1	0.0000067	J	0.33		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.33	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-196/203	42740-50-1/526~	0.000048		0.048	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.048	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-197	33091-17-7	0.000015		0.0018		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.0018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-197/200	33091-17-7/526~	0.0000027	J	0.11		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.11	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-198	68194-17-2	0.0000038		0.0023		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.0023	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-198/199	68194-17-2/526~	0.000019		0.67		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.67	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-199	52663-75-9	0.000046		0.038	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.038	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-2	2051-61-8	0.00000094	J	0.00011		mg/kg	SB407 (7/15/2021)	0.5 - 2	20/30	67%	0.000002 – 0.0012	0.00011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-20/21/33	38444-84-7/557~	0.000002	J	0.00094		mg/kg	SA-SB328 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.00094	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-20/28	38444-84-7/701~	0.00031		0.034		mg/kg	SB408 (7/16/2021)	0.5 - 2	14/16	88%	0.000018 – 0.000019	0.034	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-200	52663-73-7	0.0000054		0.0064		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.0064	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-201	40186-71-8	0.0000013	J	0.08		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	29/30	97%	0.000009 – 0.000009	0.08	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-202	2136-99-4	0.000003	J	0.11		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.11	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-203	52663-76-0	0.000014		0.38		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.38	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-204	74472-52-9	0.00000069	J	0.00000069	J	mg/kg	SA-SB324 (11/22/2019)	0.5 - 2	1/30	3%	0.000002 – 0.0012	0.00000069	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-205	74472-53-0	0.0000011	J	0.03		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.03	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-206	40186-72-9	0.0000041	J	0.11		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.11	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-207	52663-79-3	0.00000053	J	0.017		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	29/30	97%	0.0000096 – 0.0000096	0.017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-208	52663-77-1	0.00000083	J	0.022		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.022	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-209 (Decachlorobiphenyl)	2051-24-3	0.00000086	J	0.0073		mg/kg	SA-SB323 (11/22/2019)	0.5 - 2	30/30	100%	N/A	0.0073	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-21/33	55702-46-0/384~	0.000067		0.012		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	14/16	88%	0.000018 – 0.000019	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-22	38444-85-8	0.0000024		0.013		mg/kg	SB408 (7/16/2021)	0.5 - 2	27/30	90%	0.000009 – 0.0000096	0.013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-23	55720-44-0	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-24	55702-45-9	0.0000024		0.0011		mg/kg	SB408 (7/16/2021)	0.5 - 2	22/30	73%	0.000002 – 0.0012	0.0011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-25	55712-37-3	0.0000034		0.0022		mg/kg	SB408 (7/16/2021)	0.5 - 2	25/30	83%	0.000002 – 0.0012	0.0022	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-26	38444-81-4	0.000011		0.00043		mg/kg	SA-SB328 (11/15/2019)	0.5 - 2	13/14	93%	0.000002 – 0.000002	0.00043	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-26/29	38444-81-4/158~	0.00002		0.0043		mg/kg	SB408 (7/16/2021)	0.5 - 2	12/16	75%	0.000018 – 0.0024	0.0043	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-27	38444-76-7	0.0000023		0.00097	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	24/30	80%	0.000002 – 0.0012	0.00097	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-28	7012-37-5	0.0000042		0.0031		mg/kg	SA-SB328 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.0031	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-29	15862-07-4	0.0000017	J	0.000015		mg/kg	SA-SB328 (11/15/2019)	0.5 - 2	7/14	50%	0.000002 – 0.000002	0.000015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-3	2051-62-9	0.0000011	J	0.0012		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	25/30	83%	0.000009 – 0.0012	0.0012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-30	35693-92-6	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-31	16606-02-3	0.0000051		0.025		mg/kg	SB408 (7/16/2021)	0.5 - 2	27/30	90%	0.000009 – 0.0012	0.025	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-32	38444-77-8	0.0000012	J	0.0071		mg/kg	SB408 (7/16/2021)	0.5 - 2	27/30	90%	0.000009 – 0.00025	0.0071	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-34	37680-68-5	0.00000088	J	0.000037		mg/kg	SB407 (7/15/2021)	0.5 - 2	10/30	33%	0.000002 – 0.0012	0.000037	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-35	37680-69-6	0.000002		0.00047	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	15/30	50%	0.000002 – 0.0012	0.00047	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-36	38444-87-0	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-37	38444-90-5	0.0000012	J	0.012		mg/kg	SB408 (7/16/2021)	0.5 - 2	29/30	97%	0.000009 – 0.000009	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-38	53555-66-1	0.000003		0.000059		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	5/30	17%	0.000002 – 0.0012	0.000059	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-39	38444-88-1	0.0000014	J	0.0000046		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	2/30	7%	0.000002 – 0.0012	0.0000046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-4	13029-08-8	0.0000029		0.0056		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	23/30	77%	0.000002 – 0.0012	0.0056	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-40	38444-93-8	0.000012		0.00087		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	13/14	93%	0.000002 – 0.000002	0.00087	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-40/41/71	38444-93-8/526~	0.000082		0.016		mg/kg	SB408 (7/16/2021)	0.5 - 2	7/9	78%	0.000027 – 0.000029	0.016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-40/71	NOB20161110_001	0.000099	J	0.0064		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	7/7	100%	N/A	0.0064	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-41	52663-59-9	0.000026		0.0024		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	4/7	57%	0.000021 – 0.0012	0.0024	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-41/64/71/72	52663-59-9/526~	0.0000062	J	0.0045		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.0045	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-42	36559-22-5	0.000061	J	0.0055		mg/kg	SB408 (7/16/2021)	0.5 - 2	10/16	63%	0.000009 – 0.0012	0.0055	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-42/59	36559-22-5/744~	0.0000023	J	0.0017		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.0017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-43	70362-46-8	0.000012		0.000021		mg/kg	SA-SB322 (11/22/2019)	0.5 - 2	3/16	19%	0.000009 – 0.0012	0.000021	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-43/49	70362-46-8/414~	0.0000063		0.0046		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.0046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Near Surface Soil, 0.5 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0.5 – 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-44	41464-39-5	0.0000052		0.0058		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.0058	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-44/47/65	41464-39-5/243~	0.00027		0.039		mg/kg	SB408 (7/16/2021)	0.5 - 2	12/16	75%	0.000027 – 0.0035	0.039	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-45	70362-45-7	0.0000089		0.00071		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	13/14	93%	0.000002 – 0.000002	0.00071	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-45/51	70362-45-7/681~	0.000015	J	0.0063		mg/kg	SB408 (7/16/2021)	0.5 - 2	13/16	81%	0.000018 – 0.00043	0.0063	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-46	41464-47-5	0.0000037		0.0012		mg/kg	SB408 (7/16/2021)	0.5 - 2	24/30	80%	0.000002 – 0.0012	0.0012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-47	2437-79-8	0.0000036		0.0013		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.0013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-48	70362-47-9	0.00000057	J	0.0046		mg/kg	SB408 (7/16/2021)	0.5 - 2	13/16	81%	0.000009 – 0.0012	0.0046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-48/75	70362-47-9/325~	0.0000097		0.00082		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	13/14	93%	0.000004 – 0.000004	0.00082	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-49/69	41464-40-8/602~	0.00000065	J	0.035		mg/kg	SB408 (7/16/2021)	0.5 - 2	16/16	100%	N/A	0.035	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-5	16605-91-7	0.0002		0.0002		mg/kg	SB403 (7/16/2021)	0.5 - 2	1/30	3%	0.000002 – 0.0012	0.0002	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-50	62796-65-0	0.0000012	J	0.000014		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	6/14	43%	0.000002 – 0.000002	0.000014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-50/53	62796-65-0/414~	0.000019		0.0071		mg/kg	SB408 (7/16/2021)	0.5 - 2	13/16	81%	0.000018 – 0.0024	0.0071	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-51	68194-04-7	0.0000029		0.0002		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	13/14	93%	0.000002 – 0.000002	0.0002	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-52	35693-99-3	0.00035		0.07		mg/kg	SB408 (7/16/2021)	0.5 - 2	14/16	88%	0.000009 – 0.0000096	0.07	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-52/69	35693-99-3/602~	0.0000073		0.01		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.01	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-53	41464-41-9	0.0000092		0.00064		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	13/14	93%	0.000002 – 0.000002	0.00064	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-54	15968-05-5	0.0000012	J	0.00025		mg/kg	SB404 (7/16/2021)	0.5 - 2	14/30	47%	0.000002 – 0.00025	0.00025	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-55	74338-24-2	0.0000013	J	0.00083	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	20/30	67%	0.000002 – 0.0012	0.00083	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-56	41464-43-1	0.00011	J	0.017		mg/kg	SB408 (7/16/2021)	0.5 - 2	10/16	63%	0.000009 – 0.000015	0.017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-56/60	41464-43-1/330~	0.0000057		0.0031		mg/kg	SA-SB328 (11/15/2019)	0.5 - 2	14/14	100%	N/A	0.0031	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-57	70424-67-8	0.00000099	J	0.000036		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	10/30	33%	0.000002 – 0.0012	0.000036	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-58	41464-49-7	0.00000089	J	0.0047		mg/kg	SB404 (7/16/2021)	0.5 - 2	7/30	23%	0.000002 – 0.0012	0.0047	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-59/62/75	74472-33-6/542~	0.000024	J	0.0017		mg/kg	SB408 (7/16/2021)	0.5 - 2	10/16	63%	0.000027 – 0.0035	0.0017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-6	25569-80-6	0.0000027		0.0027		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	23/30	77%	0.000002 – 0.0012	0.0027	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-60	33025-41-1	0.000019		0.0077		mg/kg	SB408 (7/16/2021)	0.5 - 2	11/16	69%	0.000009 – 0.000015	0.0077	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-61/70	33284-53-6/325~	0.000014		0.062		mg/kg	SB408 (7/16/2021)	0.5 - 2	21/23	91%	0.000036 – 0.000038	0.062	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-61/70/74/76	TTNUS817	0.00054	J	0.04		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	6/7	86%	0.0047 – 0.0047	0.04	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-62	54230-22-7	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-63	74472-34-7	0.0000038		0.00069	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	20/30	67%	0.000002 – 0.0012	0.00069	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-64	52663-58-8	0.0000014	J	0.0088		mg/kg	SB408 (7/16/2021)	0.5 - 2	14/16	88%	0.000009 – 0.000018	0.0088	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-65	33284-54-7	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-66	32598-10-0	0.00015		0.034		mg/kg	SB408 (7/16/2021)	0.5 - 2	14/16	88%	0.000009 – 0.0000096	0.034	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-66/76	32598-10-0/703~	0.0000072		0.0055		mg/kg	Multiple Locations	N/A	14/14	100%	N/A	0.0055	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-67	73575-53-8	0.0000032		0.00057	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	20/30	67%	0.000002 – 0.0012	0.00057	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-68	73575-52-7	0.0000018	J	0.00036		mg/kg	SB408 (7/16/2021)	0.5 - 2	12/30	40%	0.000002 – 0.0012	0.00036	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-7	33284-50-3	0.00000089	J	0.00024		mg/kg	SB408 (7/16/2021)	0.5 - 2	17/30	57%	0.000002 – 0.0012	0.00024	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-72	41464-42-0	0.0000025	J	0.00055		mg/kg	SB404 (7/16/2021)	0.5 - 2	6/16	38%	0.000009 – 0.0012	0.00055	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-73	74338-23-1	0.00000098	J	0.000081		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	9/30	30%	0.000002 – 0.0012	0.000081	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-74	32690-93-0	0.0000032		0.0023		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.0023	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-77	32598-13-3	0.0000018	J	0.003		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	27/30	90%	0.0000044 – 0.00023	0.003	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-78	70362-49-1	0.0000018	J	0.000043		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	9/30	30%	0.000002 – 0.0012	0.000043	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-79	41464-48-6	0.0000012	J	0.004		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/30	53%	0.000002 – 0.0012	0.004	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-8	34883-43-7	0.0000016	J	0.011		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	25/30	83%	0.000009 – 0.0012	0.011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-80	33284-52-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.000002 – 0.0012	0.0012	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-81	70362-50-4	0.0000028		0.00035		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	20/30	67%	0.0000012 – 0.0014	0.00035	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-82	52663-62-4	0.000012		0.006		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	26/30	87%	0.000002 – 0.000015	0.006	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-83	60145-20-2	0.000048		0.012		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	7/7	100%	N/A	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-83/112	60145-20-2/744~	0.0000063		0.00089		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	13/14	93%	0.000004 – 0.000004	0.00089	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-83/99	60145-20-2/383~	0.00013		0.077		mg/kg	SB408 (7/16/2021)	0.5 - 2	7/9	78%	0.000018 – 0.000019	0.077	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-84	52663-60-2	0.00000085	J	0.023		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.023	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-84/92	52663-60-2/526~	0.0000076		0.0081		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	14/14	100%	N/A	0.0081	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-85/116	65510-45-4/182~	0.0000033	J	0.018		mg/kg	SB408 (7/16/2021)	0.5 - 2	21/23	91%	0.000027 – 0.000029	0.018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-85/116/117	TTNUS799	0.00012		0.00093	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	6/7	86%	0.0035 – 0.0035	0.00093	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-86	55312-69-1	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-86/87/97/109/119/125	55312-69-1/383~	0.00018		0.098		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	14/16	88%	0.000054 – 0.000057	0.098	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Near Surface Soil, 0.5 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0.5 – 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-87/117/125	38380-02-8/681~	0.0000066		0.01		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.01	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-88/91	55215-17-3/681~	0.00000045	J	0.014		mg/kg	SB408 (7/16/2021)	0.5 - 2	29/30	97%	0.000004 – 0.000004	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-89	73575-57-2	0.0000013	J	0.0006	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/30	53%	0.000002 – 0.0012	0.0006	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-9	34883-39-1	0.00000084	J	0.00082	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	19/30	63%	0.000002 – 0.0012	0.00082	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-90/101	68194-07-0/376~	0.00051		0.44		mg/kg	SB408 (7/16/2021)	0.5 - 2	7/9	78%	0.000027 – 0.000029	0.44	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-90/101/113	TTNUS619	0.002		0.74		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	7/7	100%	N/A	0.74	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-92	52663-61-3	0.0000018	J	0.071		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/16	100%	N/A	0.071	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-93	73575-56-1	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-93/100	73575-56-1/394~	0.0000076		0.0000076		mg/kg	SA-SB322 (11/22/2019)	0.5 - 2	1/7	14%	0.0000039 – 0.0024	0.0000076	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-93/95/98/100/102	73575-56-1/383~	0.00033		0.33		mg/kg	SB408 (7/16/2021)	0.5 - 2	7/9	78%	0.000045 – 0.000048	0.33	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-94	73575-55-0	0.0000019	J	0.00094		mg/kg	SB408 (7/16/2021)	0.5 - 2	17/30	57%	0.000002 – 0.0012	0.00094	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-95	38379-99-6	0.000021		0.58		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	21/21	100%	N/A	0.58	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-96	73575-54-9	0.0000011	J	0.0011		mg/kg	SB408 (7/16/2021)	0.5 - 2	21/30	70%	0.000002 – 0.0012	0.0011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-97	41464-51-1	0.0000043		0.0079		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	14/14	100%	N/A	0.0079	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-98/102	60233-25-2/681~	0.000017		0.00053	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	4/21	19%	0.000004 – 0.0024	0.00053	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-99	38380-01-7	0.0000076		0.014		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	21/21	100%	N/A	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCBC TEQ MAMMAL HALFND	CALC029P	6.38E-08		8.30E-05		mg/kg	SB408 (7/16/2021)	0.5 - 2	30/30	100%	N/A	8.30E-05	MDC	N/A	4.80E-06	*	RSL	N/A	--	Yes	MDC > SL (CRQL N/A)
Total DiCB	25512-42-9	0.0000092	J	0.025	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	26/30	87%	0 – 0.00011	0.025	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total HpCB	28655-71-2	0.00026	J	11	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	11	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total HxCB	26601-64-9	0.00034	J	11	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	11	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total MoCB	27323-18-8	0.000002	J	0.0033	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	25/30	83%	0 – 0.000029	0.0033	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total NoCB	53742-07-7	0.0000055	J	0.15	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	0.15	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total OcCB	55722-26-4	0.000076	J	2.6	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	2.6	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total PeCB	25429-29-2	0.000026	J	2.1	J	mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	2.1	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total TeCB	26914-33-0	0.0000077	J	0.33	J	mg/kg	SB408 (7/16/2021)	0.5 - 2	30/30	100%	N/A	0.33	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total TrCB	25323-68-6	0.0000026	J	0.12	J	mg/kg	SB408 (7/16/2021)	0.5 - 2	30/30	100%	N/A	0.12	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
TOTAL PCB HOMOLOGS HALFND	CALCHOMOL	0.0008163		27.1613		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	30/30	100%	N/A	27.1613	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Dioxins and Furans																					
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001-02-0	0.00000054	JZ	0.00031		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	22/24	92%	0.0000017 – 0.0000021	0.00031	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268-87-9	0.000033		0.0067	J	mg/kg	SB403 (7/16/2021)	0.5 - 2	24/24	100%	N/A	0.0067	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	0.00000032	JZ	0.00011		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	23/24	96%	0.000002 – 0.000002	0.00011	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	0.0000018	J	0.00014		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	24/24	100%	N/A	0.00014	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	0.00000039	JZ	0.000034		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	15/24	63%	0.00000016 – 0.0000022	0.000034	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	0.00000028	J	0.00011		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	21/24	88%	0.00000013 – 0.0000015	0.00011	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	0.00000025	J	0.0000022	J	mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	10/24	42%	0.00000014 – 0.0000015	0.0000022	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	0.00000021	J	0.000014		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	16/24	67%	0.000000093 – 0.0000018	0.000014	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	0.00000055	J	0.00002		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	14/24	58%	0.00000014 – 0.0000012	0.00002	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	0.00000021	J	0.0000074		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	14/24	58%	0.00000016 – 0.0000014	0.0000074	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	0.00000042	J	0.000007		mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	11/24	46%	0.00000015 – 0.0000024	0.000007	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	0.0000006	J	0.000062		mg/kg	Multiple Locations	N/A	20/24	83%	0.00000015 – 0.0000016	0.000062	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	0.00000029	J	0.0000077	Z	mg/kg	SB408 (7/16/2021)	0.5 - 2	9/24	38%	0.00000016 – 0.0000019	0.0000077	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	0.00000021	J	0.0000095		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	17/24	71%	0.000000093 – 0.00000093	0.0000095	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	0.00000024	J	0.00002		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	18/24	75%	0.00000029 – 0.00000099	0.00002	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	0.00000021	J	0.0000082		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	21/24	88%	0.00000016 – 0.00000034	0.0000082	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	0.00000014	J	0.00000045	J	mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	9/24	38%	0.000000097 – 0.00000039	0.00000045	MDC	N/A	See TEQ		N/A	0.0000052	WVDEP	No	TEQ used to evaluate chemical
DIOXIN TEQ MAMMAL HALFND	CALC029D	4.65E-07		2.45E-05		mg/kg	SA-SB320 (11/25/2019)	0.5 - 2	24/24	100%	N/A	2.45E-05	MDC	N/A	4.80E-06	*	RSL	N/A	--	Yes	MDC > SL (CRQL N/A)
Metals																					
Aluminum	7429-90-5	3370		19000		mg/kg	SB405 (7/15/2021)	0.5 - 2	30/30	100%	N/A	19000	MDC	N/A	7700		RSL	77000	WVDEP	Yes	MDC > SL (CRQL N/A)
Antimony	7440-36-0	0.29	J	4.4	J	mg/kg	SA-SB327 (11/15/2019)	0.5 - 2	17/30	57%	0.82 – 7.2	4.4	MDC	N/A	3.1		RSL	31	WVDEP	Yes	MDC > SL
Arsenic	7440-38-2	1.9		82.8		mg/kg	SA-SB317 (11/8/2019)	0.5 - 2	30/30	100%	N/A	82.8	MDC	N/A	0.68		RSL	0.68	WVDEP	Yes	MDC > SL (CRQL N/A)
Barium	7440-39-3	32.2		275		mg/kg	SA-SB310 (11/7/2019)	0.5 - 2	30/30	100%	N/A	275	MDC	N/A	1500		RSL	15000	WVDEP	No	MDC ≤ SL (CRQL N/A)
Beryllium	7440-41-7	0.29	J	1.6		mg/kg	SA-SB316 (11/8/2019)	0.5 - 2	30/30	100%	N/A	1.6	MDC	N/A	16		RSL	160	WVDEP	No	MDC ≤ SL (CRQL N/A)
Cadmium	7440-43-9	0.077	J	2.2		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	28/30	93%	0.55 – 0.6	2.2	MDC	N/A	0.71		RSL	37	WVDEP	Yes	MDC > SL
Calcium	7440-70-2	546	J	167000		mg/kg	SA-SB366 (11/15/2019)	0.5 - 2	29/30	97%	540 – 540	167000	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Chromium	7440-47-3	5.2		43.9		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	30/30	100%	N/A	43.9	MDC	N/A	0.3	*	RSL	0.3	WVDEP	Yes	MDC > SL (CRQL N/A)

Table A-2.2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Near Surface Soil, 0.5 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (0.5 – 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
Cobalt	7440-48-4	3.7	J	28.1		mg/kg	SA-SB326 (11/15/2019)	0.5 - 2	30/30	100%	N/A	28.1	MDC	N/A	2.3		RSL	23	WVDEP	Yes	MDC > SL (CRQL N/A)
Copper	7440-50-8	3		191		mg/kg	SA-SB318 (11/8/2019)	0.5 - 2	30/30	100%	N/A	191	MDC	N/A	310		RSL	3100	WVDEP	No	MDC ≤ SL (CRQL N/A)
Iron	7439-89-6	8500		60100		mg/kg	SA-SB326 (11/15/2019)	0.5 - 2	29/29	100%	N/A	60100	MDC	N/A	5500		RSL	55000	WVDEP	Yes	MDC > SL (CRQL N/A)
Lead	7439-92-1	5.2		170		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	30/30	100%	N/A	170	MDC	N/A	400		RSL	400	WVDEP	No	MDC ≤ SL (CRQL N/A)
Magnesium	7439-95-4	522	J	5650		mg/kg	SA-SB366 (11/15/2019)	0.5 - 2	30/30	100%	N/A	5650	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Manganese	7439-96-5	72		2630		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	30/30	100%	N/A	2630	MDC	N/A	180		RSL	1800	WVDEP	Yes	MDC > SL (CRQL N/A)
Mercury	7439-97-6	0.018	J	0.14		mg/kg	SB452 (7/15/2021)	0.5 - 2	19/30	63%	0.1 – 0.12	0.14	MDC	N/A	1.1	*	RSL	3.1	WVDEP	No	CRQL and MDC ≤ SL
Nickel	7440-02-0	3.4		46.7		mg/kg	SA-SB326 (11/15/2019)	0.5 - 2	30/30	100%	N/A	46.7	MDC	N/A	150		RSL	1500	WVDEP	No	MDC ≤ SL (CRQL N/A)
Potassium	7440-09-7	746		3210		mg/kg	SA-SB316 (11/8/2019)	0.5 - 2	30/30	100%	N/A	3210	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Selenium	7782-49-2	0.3	J	3.1		mg/kg	SA-SB316 (11/8/2019)	0.5 - 2	18/30	60%	2.7 – 4.2	3.1	MDC	N/A	39		RSL	390	WVDEP	No	CRQL and MDC ≤ SL
Silver	7440-22-4	0.047	J	0.37	J	mg/kg	SA-SB321 (11/25/2019)	0.5 - 2	14/30	47%	0.55 – 1.2	0.37	MDC	N/A	39		RSL	390	WVDEP	No	CRQL and MDC ≤ SL
Sodium	7440-23-5	22.3	J	256	J	mg/kg	SA-SB316 (11/8/2019)	0.5 - 2	14/30	47%	515 – 600	256	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Thallium	7440-28-0	0.038	J	0.34	J	mg/kg	SA-SB366 (11/15/2019)	0.5 - 2	10/30	33%	0.51 – 3	0.34	MDC	N/A	0.078		RSL	0.78	WVDEP	Yes	MDC > SL
Vanadium	7440-62-2	4.2		33.2		mg/kg	SA-SB321 (11/25/2019)	0.5 - 2	29/30	97%	2.7 – 2.7	33.2	MDC	N/A	39	*	RSL	460	WVDEP	No	CRQL and MDC ≤ SL
Zinc	7440-66-6	11.1		401		mg/kg	SA-SB319 (11/7/2019)	0.5 - 2	30/30	100%	N/A	401	MDC	N/A	2300		RSL	23000	WVDEP	No	MDC ≤ SL (CRQL N/A)
Cyanide																					
Cyanide	57-12-5	0.024	J	1.5	J-	mg/kg	SA-SB312 (11/7/2019)	0.5 - 2	13/16	81%	0.51 – 0.61	1.5	MDC	N/A	2.3		RSL	N/A	--	No	CRQL and MDC ≤ SL

Notes:
% = Percent
ARAR = Applicable or Relevant and Appropriate Requirements
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
CRQL = Contract Required Quantitation Limit
ft bgs = feet below gound surface
J = Estimated Concentration (+/- indicates a positive or negative bia, respectively)
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
TEQ = Toxicity Equivalence
USEPA = United States Environmental Protection Agency
WVDEP = West Virginia Department of Environmental Protection
(1) Site data screened against USEPA Residential Soil RSLs, last updated November 2021 (TR = 1E-6, THQ = 0.1).
(2) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see **Table 2-4**).
(3) As indicated in the WVDEP Voluntary Remediation Program technical guidance, residential soil "De Minimis" values pursuant to 60CSR9 (effective 12/2/2021) were selected as potential ARARs.

Table A-2.3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Subsurface Soil, > 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (> 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
Volatile Organic Compounds (VOCs)																					
1,1,1-Trichloroethane	71-55-6	0.016	J+	0.037	J+	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	2/20	10%	0.0043 – 0.01	0.037	MDC	N/A	810		RSL	640	WVDEP	No	CRQL and MDC ≤ SL
1,1,2,2-Tetrachloroethane	79-34-5	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	0.6		RSL	0.64	WVDEP	No	100% ND and CRQL ≤ SL
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	670		RSL	910	WVDEP	No	100% ND and CRQL ≤ SL
1,1,2-Trichloroethane	79-00-5	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	0.15		RSL	1.2	WVDEP	No	100% ND and CRQL ≤ SL
1,1-Dichloroethane	75-34-3	0.065	J+	0.065	J+	mg/kg	SA-SB366 (11/15/2019)	4 - 6	1/21	5%	0.0043 – 0.01	0.065	MDC	N/A	3.6		RSL	3.8	WVDEP	No	CRQL and MDC ≤ SL
1,1-Dichloroethene	75-35-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	23		RSL	240	WVDEP	No	100% ND and CRQL ≤ SL
1,2,3-Trichlorobenzene	87-61-6	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0043 – 0.01	0.01	CRQL	N/A	6.3		RSL	N/A	--	No	100% ND and CRQL ≤ SL
1,2,4-Trichlorobenzene	120-82-1	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0043 – 0.01	0.01	CRQL	N/A	5.8		RSL	24	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dibromo-3-chloropropane	96-12-8	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0043 – 0.01	0.01	CRQL	N/A	0.0053		RSL	0.0057	WVDEP	See Uncertainty	100% ND and CRQL > SL
1,2-Dibromoethane	106-93-4	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	0.036		RSL	0.039	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dichlorobenzene	95-50-1	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0043 – 0.01	0.01	CRQL	N/A	180		RSL	380	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dichloroethane	107-06-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	0.46		RSL	0.5	WVDEP	No	100% ND and CRQL ≤ SL
1,2-Dichloropropane	78-87-5	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	1.6		RSL	2.7	WVDEP	No	100% ND and CRQL ≤ SL
1,3-Dichlorobenzene	541-73-1	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0043 – 0.01	0.01	CRQL	N/A	180	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
1,4-Dichlorobenzene	106-46-7	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0043 – 0.01	0.01	CRQL	N/A	2.6		RSL	2.8	WVDEP	No	100% ND and CRQL ≤ SL
2-Butanone	78-93-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0085 – 0.02	0.02	CRQL	N/A	2700		RSL	28000	WVDEP	No	100% ND and CRQL ≤ SL
2-Hexanone	591-78-6	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0085 – 0.02	0.02	CRQL	N/A	20		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Methyl-2-pentanone	108-10-1	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0085 – 0.02	0.02	CRQL	N/A	3300		RSL	3400	WVDEP	No	100% ND and CRQL ≤ SL
Acetone	67-64-1	0.0081	J	0.058	J+	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	11/21	52%	0.0085 – 0.02	0.058	MDC	N/A	7000		RSL	61000	WVDEP	No	CRQL and MDC ≤ SL
Benzene	71-43-2	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	1.2		RSL	1.2	WVDEP	No	100% ND and CRQL ≤ SL
Bromochloromethane	74-97-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	15		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Bromodichloromethane	75-27-4	N/A		N/A		mg/kg	N/A	N/A	0/12	0%	0.0043 – 0.0064	0.0064	CRQL	N/A	0.29		RSL	0.31	WVDEP	No	100% ND and CRQL ≤ SL
Bromoform	75-25-2	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0043 – 0.01	0.01	CRQL	N/A	19		RSL	20	WVDEP	No	100% ND and CRQL ≤ SL
Bromomethane	74-83-9	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	0.68		RSL	7.3	WVDEP	No	100% ND and CRQL ≤ SL
Carbon disulfide	75-15-0	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	77		RSL	740	WVDEP	No	100% ND and CRQL ≤ SL
Carbon tetrachloride	56-23-5	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	0.65		RSL	0.7	WVDEP	No	100% ND and CRQL ≤ SL
Chlorobenzene	108-90-7	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	28		RSL	290	WVDEP	No	100% ND and CRQL ≤ SL
Chloroethane	75-00-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	540		RSL	2100	WVDEP	No	100% ND and CRQL ≤ SL
Chloroform	67-66-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	0.32		RSL	0.34	WVDEP	No	100% ND and CRQL ≤ SL
Chloromethane	74-87-3	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	11		RSL	120	WVDEP	No	100% ND and CRQL ≤ SL
cis-1,2-Dichloroethene	156-59-2	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	16		RSL	17	WVDEP	No	100% ND and CRQL ≤ SL
cis-1,3-Dichloropropene	10061-01-5	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	1.8	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Cyclohexane	110-82-7	0.0044	J	0.0044	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	1/19	5%	0.0043 – 0.01	0.0044	MDC	N/A	650		RSL	120	WVDEP	No	CRQL and MDC ≤ SL
Dibromochloromethane	124-48-1	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	8.3		RSL	8.3	WVDEP	No	100% ND and CRQL ≤ SL
Dichlorodifluoromethane	75-71-8	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	8.7		RSL	94	WVDEP	No	100% ND and CRQL ≤ SL
Ethylbenzene	100-41-4	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	5.8		RSL	6.2	WVDEP	No	100% ND and CRQL ≤ SL
Isopropylbenzene	98-82-8	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	190		RSL	270	WVDEP	No	100% ND and CRQL ≤ SL
m,p-Xylene	179601-23-1	0.0019	J	0.0019	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	1/19	5%	0.0043 – 0.01	0.0019	MDC	N/A	58	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Methyl acetate	79-20-9	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	7800		RSL	23000	WVDEP	No	100% ND and CRQL ≤ SL
Methyl tert-butyl ether	1634-04-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	47		RSL	50	WVDEP	No	100% ND and CRQL ≤ SL
Methylcyclohexane	108-87-2	0.0097	J+	0.0097	J+	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	1/19	5%	0.0043 – 0.01	0.0097	MDC	N/A	650	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Methylene chloride	75-09-2	0.0045	J	0.0055	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	3/21	14%	0.0043 – 0.01	0.0055	MDC	N/A	35		RSL	58	WVDEP	No	CRQL and MDC ≤ SL
o-Xylene	95-47-6	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	64		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Styrene	100-42-5	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	600		RSL	870	WVDEP	No	100% ND and CRQL ≤ SL
Tetrachloroethene	127-18-4	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	8.1		RSL	25	WVDEP	No	100% ND and CRQL ≤ SL
Toluene	108-88-3	0.0019	J	0.0019	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	1/19	5%	0.0043 – 0.01	0.0019	MDC	N/A	490		RSL	820	WVDEP	No	CRQL and MDC ≤ SL
trans-1,2-Dichloroethene	156-60-5	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	7		RSL	75	WVDEP	No	100% ND and CRQL ≤ SL
trans-1,3-Dichloropropene	10061-02-6	N/A		N/A		mg/kg	N/A	N/A	0/18	0%	0.0043 – 0.01	0.01	CRQL	N/A	1.8	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Trichloroethene	79-01-6	N/A		N/A		mg/kg	N/A	N/A	0/9	0%	0.0043 – 0.0064	0.0064	CRQL	N/A	0.41		RSL	1	WVDEP	No	100% ND and CRQL ≤ SL
Trichlorofluoromethane	75-69-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	2300		RSL	790	WVDEP	No	100% ND and CRQL ≤ SL
Vinyl chloride	75-01-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.0043 – 0.01	0.01	CRQL	N/A	0.059		RSL	0.061	WVDEP	No	100% ND and CRQL ≤ SL
Semi-Volatile Organic Compounds (SVOCs)																					
1,1'-Biphenyl	92-52-4	0.018	J	0.05	J	mg/kg	SA-SB314 (11/7/2019)	4 - 6	5/30	17%	0.18 – 0.22	0.05	MDC	N/A	4.7		RSL	51	WVDEP	No	CRQL and MDC ≤ SL
1,2,4,5-Tetrachlorobenzene	95-94-3	0.81		0.81		mg/kg	SB404 (7/16/2021)	2 - 4	1/30	3%	0.18 – 0.22	0.81	MDC	N/A	0.23		RSL	17	WVDEP	**Yes**	MDC > SL

Table A-2.3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Subsurface Soil, > 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (> 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
1,4-Dioxane	123-91-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.071 – 0.088	0.088	CRQL	N/A	5.3		RSL	5.4	WVDEP	No	100% ND and CRQL ≤ SL
2,2'-Oxybis(1-chloropropane)	108-60-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	310		RSL	5.1	WVDEP	No	100% ND and CRQL ≤ SL
2,3,4,6-Tetrachlorophenol	58-90-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	190		RSL	1900	WVDEP	No	100% ND and CRQL ≤ SL
2,4,5-Trichlorophenol	95-95-4	0.088	J	0.088	J	mg/kg	SB404 (7/16/2021)	2 - 4	1/30	3%	0.18 – 0.22	0.088	MDC	N/A	630		RSL	6300	WVDEP	No	CRQL and MDC ≤ SL
2,4,6-Trichlorophenol	88-06-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	6.3		RSL	49	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dichlorophenol	120-83-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	19		RSL	190	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dimethylphenol	105-67-9	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	130		RSL	1300	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dinitrophenol	51-28-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	13		RSL	130	WVDEP	No	100% ND and CRQL ≤ SL
2,4-Dinitrotoluene	121-14-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	1.7		RSL	1.7	WVDEP	No	100% ND and CRQL ≤ SL
2,6-Dinitrotoluene	606-20-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	0.36		RSL	0.36	WVDEP	No	100% ND and CRQL ≤ SL
2-Chloronaphthalene	91-58-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	480		RSL	5000	WVDEP	No	100% ND and CRQL ≤ SL
2-Chlorophenol	95-57-8	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	39		RSL	340	WVDEP	No	100% ND and CRQL ≤ SL
2-Methylnaphthalene	91-57-6	0.00069	J	0.27		mg/kg	SA-SB314 (11/7/2019)	4 - 6	25/30	83%	0.0038 – 0.21	0.27	MDC	N/A	24		RSL	310	WVDEP	No	CRQL and MDC ≤ SL
2-Methylphenol	95-48-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	320		RSL	3200	WVDEP	No	100% ND and CRQL ≤ SL
2-Nitroaniline	88-74-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	63		RSL	630	WVDEP	No	100% ND and CRQL ≤ SL
2-Nitrophenol	88-75-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	1900	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
3 & 4 Methylphenol	15831-10-4	N/A		N/A		mg/kg	N/A	N/A	0/21	0%	0.35 – 0.44	0.44	CRQL	N/A	630	*	RSL	3200	WVDEP	No	100% ND and CRQL ≤ SL
3,3'-Dichlorobenzidine	91-94-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	1.2		RSL	1.2	WVDEP	No	100% ND and CRQL ≤ SL
3-Nitroaniline	99-09-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	63	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
4,6-Dinitro-2-methylphenol	534-52-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	0.51		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Bromophenyl-phenylether	101-55-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
4-Chloro-3-methylphenol	59-50-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	630		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Chloroaniline	106-47-8	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	2.7		RSL	2.7	WVDEP	No	100% ND and CRQL ≤ SL
4-Chlorophenyl-phenylether	7005-72-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
4-Methylphenol	106-44-5	N/A		N/A		mg/kg	N/A	N/A	0/9	0%	0.37 – 0.42	0.42	CRQL	N/A	130		RSL	6300	WVDEP	No	100% ND and CRQL ≤ SL
4-Nitroaniline	100-01-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	25		RSL	N/A	--	No	100% ND and CRQL ≤ SL
4-Nitrophenol	100-02-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	1900	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
Acenaphthene	83-32-9	0.00085	J	0.2		mg/kg	SA-SB328 (11/15/2019)	2 - 4	17/29	59%	0.0038 – 0.22	0.2	MDC	N/A	360		RSL	4100	WVDEP	No	CRQL and MDC ≤ SL
Acenaphthylene	208-96-8	0.00043	J	0.66		mg/kg	SA-SB314 (11/7/2019)	4 - 6	20/30	67%	0.0037 – 0.22	0.66	MDC	N/A	See Rationale		N/A	4200	WVDEP	See Uncertainty	No SL or surrogate toxicity available
Acetophenone	98-86-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	780		RSL	2500	WVDEP	No	100% ND and CRQL ≤ SL
Anthracene	120-12-7	0.0019	J	0.64		mg/kg	SA-SB314 (11/7/2019)	4 - 6	19/30	63%	0.0038 – 0.22	0.64	MDC	N/A	1800		RSL	23000	WVDEP	No	CRQL and MDC ≤ SL
Atrazine	1912-24-9	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	2.4		RSL	2.4	WVDEP	No	100% ND and CRQL ≤ SL
Benzaldehyde	100-52-7	0.022	J	0.022	J	mg/kg	SA-SB319 (11/7/2019)	5 - 7	1/30	3%	0.35 – 0.44	0.022	MDC	N/A	170		RSL	170	WVDEP	No	CRQL and MDC ≤ SL
Benzo(a)anthracene	56-55-3	0.00041	J	5.7		mg/kg	SA-SB314 (11/7/2019)	4 - 6	24/30	80%	0.0038 – 0.22	5.7	MDC	N/A	1.1		RSL	1.5	WVDEP	**Yes**	MDC > SL
Benzo(a)pyrene	50-32-8	0.0014	J	6.1		mg/kg	SA-SB314 (11/7/2019)	4 - 6	21/30	70%	0.0038 – 0.22	6.1	MDC	N/A	0.11		RSL	0.11	WVDEP	**Yes**	MDC > SL
Benzo(b)fluoranthene	205-99-2	0.0013	J	9.5		mg/kg	SA-SB314 (11/7/2019)	4 - 6	24/30	80%	0.0038 – 0.22	9.5	MDC	N/A	1.1		RSL	1.1	WVDEP	**Yes**	MDC > SL
Benzo(g,h,i)perylene	191-24-2	0.00087	J	1.4		mg/kg	SA-SB314 (11/7/2019)	4 - 6	21/30	70%	0.0038 – 0.22	1.4	MDC	N/A	See Rationale		N/A	1800	WVDEP	See Uncertainty	No SL or surrogate toxicity available
Benzo(k)fluoranthene	207-08-9	0.00082	J	2.4		mg/kg	SA-SB314 (11/7/2019)	4 - 6	21/30	70%	0.0038 – 0.22	2.4	MDC	N/A	11		RSL	11	WVDEP	No	CRQL and MDC ≤ SL
Bis(2-chloroethoxy)methane	111-91-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	19		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Bis(2-chloroethyl)ether	111-44-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	0.23		RSL	0.24	WVDEP	See Uncertainty	100% ND and CRQL > SL
Bis(2-ethylhexyl)phthalate	117-81-7	0.019	J	0.17	J	mg/kg	SA-SB319 (11/7/2019)	5 - 7	6/30	20%	0.18 – 0.22	0.17	MDC	N/A	39		RSL	39	WVDEP	No	CRQL and MDC ≤ SL
Butylbenzylphthalate	85-68-7	0.033	J	0.049	J	mg/kg	SA-SB317 (11/8/2019)	5 - 7	2/30	7%	0.18 – 0.22	0.049	MDC	N/A	290		RSL	290	WVDEP	No	CRQL and MDC ≤ SL
Caprolactam	105-60-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	3100		RSL	31000	WVDEP	No	100% ND and CRQL ≤ SL
Carbazole	86-74-8	0.022	J	0.19	J	mg/kg	SA-SB314 (11/7/2019)	4 - 6	6/30	20%	0.35 – 0.43	0.19	MDC	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
Chrysene	218-01-9	0.0016	J	6.9		mg/kg	SA-SB314 (11/7/2019)	4 - 6	24/30	80%	0.0038 – 0.22	6.9	MDC	N/A	110		RSL	110	WVDEP	No	CRQL and MDC ≤ SL
Dibenz(a,h)anthracene	53-70-3	0.00095	J	0.71		mg/kg	SA-SB314 (11/7/2019)	4 - 6	10/30	33%	0.0037 – 0.22	0.71	MDC	N/A	0.11		RSL	0.11	WVDEP	**Yes**	MDC > SL
Dibenzofuran	132-64-9	0.037	J	0.24		mg/kg	SA-SB328 (11/15/2019)	2 - 4	8/30	27%	0.18 – 0.22	0.24	MDC	N/A	7.8		RSL	78	WVDEP	No	CRQL and MDC ≤ SL
Diethylphthalate	84-66-2	0.058	J	0.058	J	mg/kg	SA-SB315 (11/7/2019)	6 - 8	1/30	3%	0.18 – 0.22	0.058	MDC	N/A	5100		RSL	51000	WVDEP	No	CRQL and MDC ≤ SL
Dimethylphthalate	131-11-3	0.18		0.78		mg/kg	SA-SB322 (11/22/2019)	2 - 4	7/30	23%	0.18 – 0.22	0.78	MDC	N/A	See Rationale		N/A	N/A	--	See Uncertainty	No SL or surrogate toxicity available
Di-N-Butylphthalate	84-74-2	0.023	J	0.033	J	mg/kg	SA-SB319 (11/7/2019)	5 - 7	2/30	7%	0.18 – 0.22	0.033	MDC	N/A	630		RSL	6300	WVDEP	No	CRQL and MDC ≤ SL
Di-N-Octyl Phthalate	117-84-0	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	63		RSL	N/A	--	No	100% ND and CRQL ≤ SL
Fluoranthene	206-44-0	0.00079	J	7.7		mg/kg	SA-SB314 (11/7/2019)	4 - 6	25/30	83%	0.0038 – 0.41	7.7	MDC	N/A	240		RSL	2400	WVDEP	No	CRQL and MDC ≤ SL
Fluorene	86-73-7	0.00081	J	0.25		mg/kg	SA-SB328 (11/15/2019)	2 - 4	20/29	69%	0.0038 – 0.22	0.25	MDC	N/A	240		RSL	2900	WVDEP	No	CRQL and MDC ≤ SL
Hexachlorobenzene	118-74-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	0.078		RSL	0.22	WVDEP	See Uncertainty	100% ND and CRQL > SL
Hexachlorobutadiene	87-68-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	1.2		RSL	1.3	WVDEP	No	100% ND and CRQL ≤ SL

Table A-2.3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Subsurface Soil, > 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (> 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
Hexachlorocyclopentadiene	77-47-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.35 – 0.44	0.44	CRQL	N/A	0.18		RSL	1.9	WVDEP	See Uncertainty	100% ND and CRQL > SL
Hexachloroethane	67-72-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	1.8		RSL	2	WVDEP	No	100% ND and CRQL ≤ SL
Indeno(1,2,3-cd)pyrene	193-39-5	0.00083	J	1.7		mg/kg	SA-SB314 (11/7/2019)	4 - 6	21/30	70%	0.0038 – 0.22	1.7	MDC	N/A	1.1		RSL	1.1	WVDEP	Yes	MDC > SL
Isophorone	78-59-1	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	570		RSL	570	WVDEP	No	100% ND and CRQL ≤ SL
Naphthalene	91-20-3	0.0015	J	0.23		mg/kg	SA-SB328 (11/15/2019)	2 - 4	21/30	70%	0.0038 – 0.22	0.23	MDC	N/A	2		RSL	2.4	WVDEP	No	CRQL and MDC ≤ SL
Naphthalene, 1-methyl-	90-12-0	0.0038		0.095	J	mg/kg	SB452 (7/15/2021)	2 - 4	6/9	67%	0.0038 – 0.0042	0.095	MDC	N/A	18		RSL	24	WVDEP	No	CRQL and MDC ≤ SL
Nitrobenzene	98-95-3	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	5.1		RSL	5.5	WVDEP	No	100% ND and CRQL ≤ SL
N-Nitroso-di-n-propylamine (NDPA)	621-64-7	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	0.078		RSL	0.078	WVDEP	See Uncertainty	100% ND and CRQL > SL
N-Nitrosodiphenylamine	86-30-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	110		RSL	110	WVDEP	No	100% ND and CRQL ≤ SL
Pentachlorophenol	87-86-5	0.00098	J	0.00098	J	mg/kg	SA-SB320 (11/25/2019)	2 - 4	1/30	3%	0.0075 – 0.44	0.00098	MDC	N/A	1		RSL	1	WVDEP	No	CRQL and MDC ≤ SL
Phenanthrene	85-01-8	0.00086	J	1.2		mg/kg	SA-SB314 (11/7/2019)	4 - 6	27/30	90%	0.0038 – 0.21	1.2	MDC	N/A	See Rationale		N/A	23000	WVDEP	See Uncertainty	No SL or surrogate toxicity available
Phenol	108-95-2	0.045	J	0.077	J	mg/kg	SA-SB322 (11/22/2019)	2 - 4	7/30	23%	0.36 – 0.44	0.077	MDC	N/A	1900		RSL	19000	WVDEP	No	CRQL and MDC ≤ SL
Pyrene	129-00-0	0.00067	J	7.3		mg/kg	SA-SB314 (11/7/2019)	4 - 6	25/30	83%	0.0038 – 0.21	7.3	MDC	N/A	180		RSL	2300	WVDEP	No	CRQL and MDC ≤ SL
Pesticides																					
4,4'-DDD	72-54-8	0.00036	J	0.0027	J	mg/kg	SA-SB314 (11/7/2019)	4 - 6	7/29	24%	0.0036 – 0.0043	0.0027	MDC	N/A	0.19		RSL	1.9	WVDEP	No	CRQL and MDC ≤ SL
4,4'-DDE	72-55-9	0.00045	J	0.0012	J	mg/kg	SB403 (7/16/2021)	2 - 4	2/30	7%	0.0035 – 0.0043	0.0012	MDC	N/A	2		RSL	2	WVDEP	No	CRQL and MDC ≤ SL
4,4'-DDT	50-29-3	0.00038	J	0.0089		mg/kg	SA-SB328 (11/15/2019)	2 - 4	4/30	13%	0.0035 – 0.0043	0.0089	MDC	N/A	1.9		RSL	1.9	WVDEP	No	CRQL and MDC ≤ SL
Aldrin	309-00-2	0.00026	J	0.00041	J	mg/kg	SB403 (7/16/2021)	2 - 4	2/30	7%	0.0018 – 0.0022	0.00041	MDC	N/A	0.039		RSL	0.039	WVDEP	No	CRQL and MDC ≤ SL
alpha-BHC	319-84-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0018 – 0.0022	0.0022	CRQL	N/A	0.086		RSL	0.086	WVDEP	No	100% ND and CRQL ≤ SL
beta-BHC	319-85-7	0.00025	J	0.0005	J	mg/kg	SB404 (7/16/2021)	2 - 4	3/30	10%	0.0018 – 0.0022	0.0005	MDC	N/A	0.3		RSL	0.3	WVDEP	No	CRQL and MDC ≤ SL
cis-Chlordane	5103-71-9	0.00081	J	0.00092	J	mg/kg	SA-SB328 (11/15/2019)	2 - 4	2/30	7%	0.0018 – 0.0022	0.00092	MDC	N/A	3.6		RSL	N/A	--	No	CRQL and MDC ≤ SL
delta-BHC	319-86-8	0.0004	J	0.0034	J	mg/kg	SB404 (7/16/2021)	2 - 4	2/30	7%	0.0018 – 0.0022	0.0034	MDC	N/A	0.086	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Dieldrin	60-57-1	0.0017	J	0.75	J	mg/kg	SB404 (7/16/2021)	2 - 4	3/30	10%	0.0035 – 0.0043	0.75	MDC	N/A	0.034		RSL	0.042	WVDEP	Yes	MDC > SL
Endosulfan I	959-98-8	0.00035	J	0.00035	J	mg/kg	SA-SB328 (11/15/2019)	2 - 4	1/30	3%	0.0018 – 0.0022	0.00035	MDC	N/A	47	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Endosulfan II	33213-65-9	0.00071	J	0.51	J	mg/kg	SB404 (7/16/2021)	2 - 4	4/28	14%	0.0035 – 0.0043	0.51	MDC	N/A	47	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Endosulfan Sulfate	1031-07-8	0.00088	J	0.00088	J	mg/kg	SA-SB328 (11/15/2019)	2 - 4	1/30	3%	0.0035 – 0.0043	0.00088	MDC	N/A	38		RSL	N/A	--	No	CRQL and MDC ≤ SL
Endrin	72-20-8	0.00024	J	0.63	J	mg/kg	SB404 (7/16/2021)	2 - 4	6/30	20%	0.0036 – 0.0043	0.63	MDC	N/A	1.9		RSL	19	WVDEP	No	CRQL and MDC ≤ SL
Endrin Aldehyde	7421-93-4	0.0011	J	0.0011	J	mg/kg	SA-SB328 (11/15/2019)	2 - 4	1/30	3%	0.0035 – 0.0043	0.0011	MDC	N/A	1.9	*	RSL	N/A	--	No	CRQL and MDC ≤ SL
Endrin Ketone	53494-70-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0035 – 0.0043	0.0043	CRQL	N/A	1.9	*	RSL	N/A	--	No	100% ND and CRQL ≤ SL
gamma-BHC (Lindane)	58-89-9	0.0004	J	0.0033	J	mg/kg	SA-SB314 (11/7/2019)	4 - 6	10/29	34%	0.0019 – 0.0022	0.0033	MDC	N/A	0.071		RSL	0.57	WVDEP	No	CRQL and MDC ≤ SL
Heptachlor	76-44-8	0.00058	J	0.00058	J	mg/kg	SA-SB328 (11/15/2019)	2 - 4	1/30	3%	0.0018 – 0.0022	0.00058	MDC	N/A	0.13		RSL	0.14	WVDEP	No	CRQL and MDC ≤ SL
Heptachlor Epoxide	1024-57-3	0.00051	J	0.00051	J	mg/kg	SA-SB328 (11/15/2019)	2 - 4	1/30	3%	0.0018 – 0.0022	0.00051	MDC	N/A	0.07		RSL	0.071	WVDEP	No	CRQL and MDC ≤ SL
Methoxychlor	72-43-5	0.003	J	0.026		mg/kg	SA-SB328 (11/15/2019)	2 - 4	2/30	7%	0.018 – 0.022	0.026	MDC	N/A	32		RSL	320	WVDEP	No	CRQL and MDC ≤ SL
Toxaphene	8001-35-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.18 – 0.22	0.22	CRQL	N/A	0.49		RSL	0.49	WVDEP	No	100% ND and CRQL ≤ SL
trans-Chlordane	5103-74-2	0.00074	J	1.2		mg/kg	SB404 (7/16/2021)	2 - 4	4/30	13%	0.0018 – 0.0022	1.2	MDC	N/A	3.6		RSL	N/A	--	No	CRQL and MDC ≤ SL
Polychlorinated Biphenyls (PCBs)																					
Aroclor 1016	12674-11-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.035 – 0.329	0.329	CRQL	N/A	0.41		RSL	5.5	WVDEP	No	100% ND and CRQL ≤ SL
Aroclor 1221	11104-28-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.035 – 0.658	0.658	CRQL	N/A	0.2		RSL	0.26	WVDEP	See Uncertainty	100% ND and CRQL > SL
Aroclor 1232	11141-16-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.035 – 0.329	0.329	CRQL	N/A	0.17		RSL	0.22	WVDEP	See Uncertainty	100% ND and CRQL > SL
Aroclor 1242	53469-21-9	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.035 – 0.329	0.329	CRQL	N/A	0.23		RSL	0.31	WVDEP	See Uncertainty	100% ND and CRQL > SL
Aroclor 1248	12672-29-6	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.035 – 0.329	0.329	CRQL	N/A	0.23		RSL	0.31	WVDEP	See Uncertainty	100% ND and CRQL > SL
Aroclor 1254	11097-69-1	0.0061	J	0.387		mg/kg	SA-SB319 (11/7/2019)	5 - 7	5/30	17%	0.035 – 0.329	0.387	MDC	N/A	0.12		RSL	0.32	WVDEP	Yes	MDC > SL
Aroclor 1260	11096-82-5	0.0069	J	11	C	mg/kg	SA-SB320 (11/25/2019)	2 - 4	13/30	43%	0.04 – 0.329	11	MDC	N/A	0.24		RSL	0.33	WVDEP	Yes	MDC > SL
Aroclor 1262	37324-23-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.035 – 0.329	0.329	CRQL	N/A	0.23	*	RSL	N/A	--	See Uncertainty	100% ND and CRQL > SL
Aroclor 1268	11100-14-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.035 – 0.329	0.329	CRQL	N/A	0.23	*	RSL	N/A	--	See Uncertainty	100% ND and CRQL > SL
TOTAL AROCLOR HALFND	CALC021	0.1549		11.16		mg/kg	SA-SB320 (11/25/2019)	2 - 4	30/30	100%	N/A	11.16	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
PCBs - Congeners																					
PCB-1	2051-60-7	0.00000053	J	0.0063		mg/kg	SA-SB317 (11/8/2019)	5 - 7	19/30	63%	0.000002 – 0.0000096	0.0063	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-10	33146-45-1	0.0000012	J	0.00064		mg/kg	SB404 (7/16/2021)	2 - 4	10/30	33%	0.0000019 – 0.000019	0.00064	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-100	39485-83-1	0.0000031		0.000067		mg/kg	SA-SB319 (11/7/2019)	5 - 7	4/14	29%	0.000002 – 0.000002	0.000067	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-101/90	PCB101/90	0.0000062		0.074	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000004 – 0.000004	0.074	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-103	60145-21-3	0.000005		0.0027		mg/kg	SB404 (7/16/2021)	2 - 4	11/30	37%	0.0000019 – 0.0011	0.0027	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-104	56558-16-8	0.00000072	J	0.000024	J	mg/kg	SB404 (7/16/2021)	2 - 4	2/30	7%	0.0000019 – 0.0011	0.000024	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-105	32598-14-4	0.00000072	J	0.071		mg/kg	SB404 (7/16/2021)	2 - 4	27/30	90%	0.00000071 – 0.0000042	0.071	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-106	70424-69-0	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Subsurface Soil, > 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (> 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-107	70424-68-9	0.0000015	J	0.0025		mg/kg	SA-SB320 (11/25/2019)	2 - 4	6/7	86%	0.000002 – 0.000002	0.0025	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-107/108	70424-68-9/703~	0.0000026	J	0.0024		mg/kg	SA-SB319 (11/7/2019)	5 - 7	8/14	57%	0.000004 – 0.000004	0.0024	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-107/124	70424-68-9/704~	0.0000015	J	0.01		mg/kg	SB404 (7/16/2021)	2 - 4	5/9	56%	0.000018 – 0.000019	0.01	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-108/124	70362-41-3/704~	0.0000014	J	0.0018	J	mg/kg	SA-SB320 (11/25/2019)	2 - 4	7/7	100%	N/A	0.0018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-109	74472-35-8	0.00014		0.0078		mg/kg	SB404 (7/16/2021)	2 - 4	4/23	17%	0.000002 – 0.0000096	0.0078	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-11	2050-67-1	0.0000014	J	0.00011		mg/kg	SA-SB319 (11/7/2019)	5 - 7	15/30	50%	0.000002 – 0.0011	0.00011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-110	38380-03-9	0.0000044		0.058	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.058	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-110/115	38380-03-9/744~	0.000018		0.96		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.000019 – 0.000019	0.96	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-111	39635-32-0	0.00038		0.00038		mg/kg	SB404 (7/16/2021)	2 - 4	1/16	6%	0.0000019 – 0.0011	0.00038	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-111/115	39635-32-0/744~	0.0000033	J	0.00079		mg/kg	SA-SB319 (11/7/2019)	5 - 7	7/14	50%	0.000004 – 0.000004	0.00079	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-112	74472-36-9	N/A		N/A		mg/kg	N/A	N/A	0/16	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-113	68194-10-5	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-114	74472-37-0	0.0000014	J	0.0038		mg/kg	SB404 (7/16/2021)	2 - 4	16/30	53%	0.00000044 – 0.000082	0.0038	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-118	31508-00-6	0.0000051	J	0.33		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.0000044 – 0.0000044	0.33	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-118/106	31508-00-6/704~	0.0000025	J	0.036		mg/kg	SA-SB319 (11/7/2019)	5 - 7	13/14	93%	0.00000069 – 0.00000069	0.036	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-119	56558-17-9	0.0000015	J	0.00058		mg/kg	SA-SB319 (11/7/2019)	5 - 7	9/14	64%	0.000002 – 0.000002	0.00058	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-12	2974-92-7	0.0000019	J	0.00018		mg/kg	SA-SB316 (11/8/2019)	2 - 4	6/14	43%	0.000002 – 0.000002	0.00018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-12/13	2974-92-7/2974~	0.0000046		0.0016		mg/kg	SB404 (7/16/2021)	2 - 4	5/16	31%	0.0000039 – 0.0022	0.0016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-120	68194-12-7	0.000002		0.014		mg/kg	SB404 (7/16/2021)	2 - 4	13/30	43%	0.0000019 – 0.0011	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-121	56558-18-0	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-122	76842-07-4	0.0000025		0.00046		mg/kg	SA-SB319 (11/7/2019)	5 - 7	9/30	30%	0.0000019 – 0.0011	0.00046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-123	65510-44-3	0.0000022		0.0024		mg/kg	SB404 (7/16/2021)	2 - 4	15/30	50%	0.00000043 – 0.00039	0.0024	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-124	70424-70-3	0.0000038		0.0027		mg/kg	SA-SB316 (11/8/2019)	2 - 4	8/14	57%	0.000002 – 0.000002	0.0027	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-126	57465-28-8	0.00000054	Z	0.00057		mg/kg	SB404 (7/16/2021)	2 - 4	15/29	52%	0.00000048 – 0.00047	0.00057	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-127	39635-33-1	0.00000093	J	0.00000093	J	mg/kg	SA-SB323 (11/22/2019)	4 - 6	1/30	3%	0.0000019 – 0.0011	0.00000093	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-128/162	38380-07-3/396~	0.0000017	J	0.023		mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000004 – 0.000004	0.023	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-128/166	38380-07-3/414~	0.000028		0.41		mg/kg	SB404 (7/16/2021)	2 - 4	12/16	75%	0.0000039 – 0.000019	0.41	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-129	55215-18-4	0.0000018	J	0.0049		mg/kg	SA-SB316 (11/8/2019)	2 - 4	10/14	71%	0.000002 – 0.000002	0.0049	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-129/138/163	55215-18-4/350~	0.000057		3.1		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.000038 – 0.000038	3.1	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-13	2974-90-5	0.0000022		0.00018		mg/kg	SA-SB316 (11/8/2019)	2 - 4	6/14	43%	0.000002 – 0.000002	0.00018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-130	52663-66-8	0.000002	J	0.2		mg/kg	SB404 (7/16/2021)	2 - 4	25/30	83%	0.000002 – 0.0000096	0.2	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-131	61798-70-7	0.0000022		0.044		mg/kg	SB404 (7/16/2021)	2 - 4	10/16	63%	0.000002 – 0.0000096	0.044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-131/133	61798-70-7/356~	0.0000045		0.0065		mg/kg	SA-SB316 (11/8/2019)	2 - 4	10/14	71%	0.000004 – 0.000004	0.0065	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-132	38380-05-1	0.000024		1.7		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.0000095 – 0.0000095	1.7	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-132/161	38380-05-1/744~	0.0000054		0.097	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000004 – 0.000004	0.097	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-133	35694-04-3	0.0000017	J	0.074		mg/kg	SB404 (7/16/2021)	2 - 4	13/16	81%	0.0000095 – 0.0000096	0.074	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-134	52704-70-8	0.000018		0.061		mg/kg	SA-SB320 (11/25/2019)	2 - 4	7/7	100%	N/A	0.061	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-134/143	52704-70-8/681~	0.0000016	J	0.26		mg/kg	SB404 (7/16/2021)	2 - 4	17/23	74%	0.000004 – 0.000019	0.26	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-135	52744-13-5	0.0000026		0.052	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.052	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-135/151	52744-13-5/526~	0.0000025	J	2.9		mg/kg	SB404 (7/16/2021)	2 - 4	16/16	100%	N/A	2.9	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-136	38411-22-2	0.0000031		1.2		mg/kg	SB404 (7/16/2021)	2 - 4	26/30	87%	0.000002 – 0.0000095	1.2	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-137	35694-06-5	0.00000098	J	0.25		mg/kg	SB403 (7/16/2021)	2 - 4	20/30	67%	0.000002 – 0.000078	0.25	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-138/163/164	35065-28-2/744~	0.00002		0.33	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000006 – 0.000006	0.33	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-139/140	56030-56-9/592~	0.0000011	J	0.0055		mg/kg	SB404 (7/16/2021)	2 - 4	8/16	50%	0.0000039 – 0.0022	0.0055	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-139/149	56030-56-9/383~	0.000018		0.35	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000004 – 0.000004	0.35	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-14	34883-41-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-140	59291-64-4	0.0000015	J	0.00026		mg/kg	SA-SB317 (11/8/2019)	5 - 7	5/14	36%	0.000002 – 0.000002	0.00026	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-141	52712-04-6	0.0000013	J	2		mg/kg	SB404 (7/16/2021)	2 - 4	29/30	97%	0.000002 – 0.000002	2	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-142	41411-61-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-143	68194-15-0	N/A		N/A		mg/kg	N/A	N/A	0/7	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-144	68194-14-9	0.000001	J	0.57		mg/kg	SB404 (7/16/2021)	2 - 4	28/30	93%	0.000002 – 0.0000095	0.57	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-145	74472-40-5	0.000002	J	0.000015		mg/kg	SA-SB316 (11/8/2019)	2 - 4	3/30	10%	0.0000019 – 0.0011	0.000015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-146	51908-16-8	0.00000092	J	0.76		mg/kg	SB404 (7/16/2021)	2 - 4	16/16	100%	N/A	0.76	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-146/165	51908-16-8/744~	0.0000027	J	0.046	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000004 – 0.000004	0.046	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-147	68194-13-8	0.0000017	J	0.001		mg/kg	SA-SB316 (11/8/2019)	2 - 4	9/14	64%	0.000002 – 0.000002	0.001	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Subsurface Soil, > 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (> 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-147/149	68194-13-8/383~	0.000033		3.3		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.000019 – 0.000019	3.3	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-148	74472-41-6	0.000001	J	0.0000025		mg/kg	SA-SB321 (11/25/2019)	5 - 7	2/30	7%	0.0000019 – 0.0011	0.0000025	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-15	2050-68-2	0.00000096	J	0.0098		mg/kg	SB404 (7/16/2021)	2 - 4	19/30	63%	0.0000019 – 0.000019	0.0098	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-150	68194-08-1	0.0000012	J	0.0012		mg/kg	SB404 (7/16/2021)	2 - 4	10/30	33%	0.0000019 – 0.0011	0.0012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-151	52663-63-5	0.000006		0.14	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.14	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-152	68194-09-2	0.00000057	J	0.00054		mg/kg	SB404 (7/16/2021)	2 - 4	6/30	20%	0.0000019 – 0.0011	0.00054	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-153	35065-27-1	0.000021		0.34	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.34	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-153/168	35065-27-1/592~	0.000064		3		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.000019 – 0.000019	3	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-154	60145-22-4	0.00000061	J	0.00038		mg/kg	SA-SB317 (11/8/2019)	5 - 7	14/21	67%	0.000002 – 0.0011	0.00038	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-155	33979-03-2	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-156	38380-08-4	0.0000015	J	0.0068		mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.00000055 – 0.00000055	0.0068	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-156/157	38380-08-4/697~	0.0000079	J	0.35		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.0000072 – 0.0000072	0.35	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-157	69782-90-7	0.0000011	J	0.0014		mg/kg	SA-SB319 (11/7/2019)	5 - 7	7/14	50%	0.0000006 – 0.0000014	0.0014	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-158	74472-42-7	0.00000061	J	0.56		mg/kg	SB404 (7/16/2021)	2 - 4	16/16	100%	N/A	0.56	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-158/160	74472-42-7/414~	0.0000021	J	0.029		mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000004 – 0.000004	0.029	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-159	39635-35-3	0.0000021	J	0.11		mg/kg	SB404 (7/16/2021)	2 - 4	16/30	53%	0.0000019 – 0.0011	0.11	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-16	38444-78-9	0.00000083	J	0.0073		mg/kg	SB404 (7/16/2021)	2 - 4	20/30	67%	0.0000019 – 0.0000096	0.0073	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-160	41411-62-5	N/A		N/A		mg/kg	N/A	N/A	0/7	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-161	74472-43-8	0.0000083	J	0.000051		mg/kg	SB450 (7/15/2021)	2 - 4	3/16	19%	0.0000019 – 0.0011	0.000051	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-162	39635-34-2	0.0000037		0.0041		mg/kg	SB404 (7/16/2021)	2 - 4	6/16	38%	0.0000019 – 0.0011	0.0041	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-164	74472-45-0	0.0000041	J	0.47		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.0000093 – 0.0000095	0.47	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-165	74472-46-1	0.00033		0.037		mg/kg	SB403 (7/16/2021)	2 - 4	2/16	13%	0.0000019 – 0.0011	0.037	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-166	41411-63-6	0.0000024		0.00018		mg/kg	SA-SB319 (11/7/2019)	5 - 7	5/14	36%	0.000002 – 0.000002	0.00018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-167	52663-72-6	0.0000016	J	0.14		mg/kg	SB404 (7/16/2021)	2 - 4	25/30	83%	0.00000059 – 0.0048	0.14	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-168	59291-65-5	0.0000016	J	0.0000016	J	mg/kg	SA-SB327 (11/15/2019)	6 - 8	1/14	7%	0.000002 – 0.000002	0.0000016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-169	32774-16-6	0.0000024	Z	0.000096		mg/kg	SA-SB316 (11/8/2019)	2 - 4	6/30	20%	0.00000045 – 0.00053	0.000096	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-17	37680-66-3	0.0000015	J	0.0092		mg/kg	SB404 (7/16/2021)	2 - 4	19/30	63%	0.0000019 – 0.0000096	0.0092	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-170	35065-30-6	0.0000023	J	2.4		mg/kg	SB404 (7/16/2021)	2 - 4	29/30	97%	0.000002 – 0.000002	2.4	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-171	52663-71-5	0.0000027		0.055	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.055	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-171/173	52663-71-5/681~	0.000015	J	0.92		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.000019 – 0.000019	0.92	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-172	52663-74-8	0.0000018	J	0.51		mg/kg	SB404 (7/16/2021)	2 - 4	27/30	90%	0.000002 – 0.0000095	0.51	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-173	68194-16-1	0.000021		0.0042		mg/kg	SA-SB316 (11/8/2019)	2 - 4	7/14	50%	0.000002 – 0.000002	0.0042	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-174	38411-25-5	0.000012		2.3		mg/kg	SB404 (7/16/2021)	2 - 4	28/30	93%	0.000002 – 0.0000095	2.3	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-175	40186-70-7	0.0000022	J	0.13		mg/kg	SB404 (7/16/2021)	2 - 4	23/30	77%	0.000002 – 0.0000096	0.13	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-176	52663-65-7	0.0000014	J	0.43		mg/kg	SB404 (7/16/2021)	2 - 4	27/30	90%	0.000002 – 0.0000095	0.43	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-177	52663-70-4	0.0000018	J	0.52		mg/kg	SA-SB320 (11/25/2019)	2 - 4	29/30	97%	0.000002 – 0.000002	0.52	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-178	52663-67-9	0.0000027		0.6		mg/kg	SB404 (7/16/2021)	2 - 4	28/30	93%	0.000002 – 0.0000095	0.6	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-179	52663-64-6	0.0000046		1.3		mg/kg	SB404 (7/16/2021)	2 - 4	28/30	93%	0.000002 – 0.0000095	1.3	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-18	37680-65-2	0.000011		0.0068		mg/kg	SA-SB316 (11/8/2019)	2 - 4	8/14	57%	0.000002 – 0.000002	0.0068	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-18/30	37680-65-2/356~	0.0000011	J	0.02		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.000019 – 0.000019	0.02	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-180	35065-29-3	0.000026		0.52	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.52	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-180/193	35065-29-3/697~	0.000039		3.2		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.000019 – 0.000019	3.2	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-181	74472-47-2	0.00000091	J	0.89		mg/kg	SB404 (7/16/2021)	2 - 4	7/30	23%	0.0000019 – 0.000019	0.89	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-182	60145-23-5	0.00000061	J	0.098		mg/kg	SB403 (7/16/2021)	2 - 4	4/16	25%	0.0000019 – 0.0011	0.098	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-182/187	60145-23-5/526~	0.000012		0.23	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000004 – 0.000004	0.23	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-183	52663-69-1	0.0000069		0.12	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.12	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-183/185	52663-69-1/527~	0.000036		2		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.000019 – 0.000019	2	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-184	74472-48-3	0.0000012	J	0.000037		mg/kg	SA-SB316 (11/8/2019)	2 - 4	5/30	17%	0.0000019 – 0.0011	0.000037	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-185	52712-05-7	0.0000015	J	0.026	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.026	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-186	74472-49-4	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-187	52663-68-0	0.0000042	J	2.5		mg/kg	SB404 (7/16/2021)	2 - 4	16/16	100%	N/A	2.5	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-188	74487-85-7	0.0000011	J	0.00047		mg/kg	SB404 (7/16/2021)	2 - 4	10/30	33%	0.0000019 – 0.0011	0.00047	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-189	39635-31-9	0.000002		0.1		mg/kg	SB404 (7/16/2021)	2 - 4	23/30	77%	0.00000045 – 0.0000043	0.1	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-19	38444-73-4	0.0000025		0.0031		mg/kg	SB404 (7/16/2021)	2 - 4	17/30	57%	0.0000019 – 0.0000096	0.0031	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-190	41411-64-7	0.00000073	J	0.55		mg/kg	SB404 (7/16/2021)	2 - 4	29/30	97%	0.000002 – 0.000002	0.55	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Subsurface Soil, > 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (> 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-191	74472-50-7	0.0000016	J	0.12		mg/kg	SB404 (7/16/2021)	2 - 4	24/30	80%	0.000002 – 0.0000095	0.12	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-192	74472-51-8	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-193	69782-91-8	0.0000013	J	0.023		mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.023	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-194	35694-08-7	0.0000052		1.1		mg/kg	SB404 (7/16/2021)	2 - 4	28/30	93%	0.000002 – 0.0000095	1.1	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-195	52663-78-2	0.000002		0.54		mg/kg	SB404 (7/16/2021)	2 - 4	28/30	93%	0.000002 – 0.0000095	0.54	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-196	42740-50-1	0.0000045	J	0.64		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.0000095 – 0.0000095	0.64	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-196/203	42740-50-1/526~	0.0000051		0.12	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000004 – 0.000004	0.12	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-197	33091-17-7	0.0000035		0.0036		mg/kg	SA-SB316 (11/8/2019)	2 - 4	9/14	64%	0.000002 – 0.000002	0.0036	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-197/200	33091-17-7/526~	0.0000016	J	0.17		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.000019 – 0.000019	0.17	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-198	68194-17-2	0.0000019	J	0.0044		mg/kg	SA-SB316 (11/8/2019)	2 - 4	10/14	71%	0.000002 – 0.000002	0.0044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-198/199	68194-17-2/526~	0.000044		0.94		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.000019 – 0.000019	0.94	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-199	52663-75-9	0.000005		0.097	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000002 – 0.000002	0.097	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-2	2051-61-8	0.0000014	J	0.00041		mg/kg	SB404 (7/16/2021)	2 - 4	17/30	57%	0.000002 – 0.000023	0.00041	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-20/21/33	38444-84-7/557~	0.00000083	J	0.0029		mg/kg	SA-SB316 (11/8/2019)	2 - 4	8/14	57%	0.000006 – 0.000006	0.0029	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-20/28	38444-84-7/701~	0.0000044		0.028		mg/kg	SB404 (7/16/2021)	2 - 4	12/16	75%	0.000018 – 0.000019	0.028	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-200	52663-73-7	0.0000016	J	0.012		mg/kg	SA-SB316 (11/8/2019)	2 - 4	12/14	86%	0.000002 – 0.000002	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-201	40186-71-8	0.00000062	J	0.13		mg/kg	SB404 (7/16/2021)	2 - 4	26/30	87%	0.000002 – 0.0000095	0.13	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-202	2136-99-4	0.0000017	J	0.16		mg/kg	SB404 (7/16/2021)	2 - 4	27/30	90%	0.000002 – 0.0000095	0.16	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-203	52663-76-0	0.0000086	J	0.68		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.0000095 – 0.0000095	0.68	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-204	74472-52-9	0.0000011	J	0.00017		mg/kg	SB404 (7/16/2021)	2 - 4	2/30	7%	0.0000019 – 0.0011	0.00017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-205	74472-53-0	0.0000021	J	0.054		mg/kg	SB404 (7/16/2021)	2 - 4	23/30	77%	0.000002 – 0.000019	0.054	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-206	40186-72-9	0.0000011	J	0.22		mg/kg	SB404 (7/16/2021)	2 - 4	28/30	93%	0.000002 – 0.0000095	0.22	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-207	52663-79-3	0.000002		0.034		mg/kg	SB404 (7/16/2021)	2 - 4	24/30	80%	0.000002 – 0.0000095	0.034	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-208	52663-77-1	0.0000017	J	0.036		mg/kg	SB404 (7/16/2021)	2 - 4	25/30	83%	0.000002 – 0.0000095	0.036	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-209 (Decachlorobiphenyl)	2051-24-3	0.000001	J	0.0072		mg/kg	SA-SB319 (11/7/2019)	5 - 7	25/30	83%	0.000002 – 0.0000095	0.0072	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-21/33	55702-46-0/384~	0.0000069		0.014		mg/kg	SB404 (7/16/2021)	2 - 4	10/16	63%	0.0000039 – 0.000019	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-22	38444-85-8	0.00000094	J	0.011		mg/kg	SB404 (7/16/2021)	2 - 4	22/30	73%	0.000002 – 0.0000096	0.011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-23	55720-44-0	0.0000022	J	0.000041	J	mg/kg	SB404 (7/16/2021)	2 - 4	2/30	7%	0.0000019 – 0.0011	0.000041	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-24	55702-45-9	0.00000047	J	0.0016		mg/kg	SB404 (7/16/2021)	2 - 4	12/30	40%	0.0000019 – 0.0011	0.0016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-25	55712-37-3	0.00000082	J	0.0026		mg/kg	SB404 (7/16/2021)	2 - 4	17/30	57%	0.0000019 – 0.0000096	0.0026	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-26	38444-81-4	0.0000062		0.0016		mg/kg	SA-SB316 (11/8/2019)	2 - 4	7/14	50%	0.000002 – 0.000002	0.0016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-26/29	38444-81-4/158~	0.00000069	J	0.0058		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.000019 – 0.000019	0.0058	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-27	38444-76-7	0.0000011	J	0.0013		mg/kg	SB404 (7/16/2021)	2 - 4	18/30	60%	0.0000019 – 0.0000096	0.0013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-28	7012-37-5	0.0000021		0.01		mg/kg	SA-SB316 (11/8/2019)	2 - 4	11/14	79%	0.000002 – 0.000002	0.01	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-29	15862-07-4	0.00000096	J	0.00002		mg/kg	SA-SB316 (11/8/2019)	2 - 4	4/14	29%	0.000002 – 0.000002	0.00002	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-3	2051-62-9	0.00000069	J	0.0028		mg/kg	SB404 (7/16/2021)	2 - 4	20/30	67%	0.000002 – 0.0000096	0.0028	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-30	35693-92-6	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-31	16606-02-3	0.0000019	J	0.028		mg/kg	SB404 (7/16/2021)	2 - 4	23/30	77%	0.000002 – 0.0000096	0.028	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-32	38444-77-8	0.0000024		0.0081		mg/kg	SB404 (7/16/2021)	2 - 4	19/30	63%	0.0000019 – 0.0000096	0.0081	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-34	37680-68-5	0.00000041	J	0.00014		mg/kg	SB404 (7/16/2021)	2 - 4	10/30	33%	0.0000019 – 0.0011	0.00014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-35	37680-69-6	0.0000011	J	0.00024		mg/kg	SA-SB316 (11/8/2019)	2 - 4	7/30	23%	0.0000019 – 0.0011	0.00024	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-36	38444-87-0	0.0000017	J	0.0000017	J	mg/kg	SA-SB319 (11/7/2019)	5 - 7	1/30	3%	0.0000019 – 0.0011	0.0000017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-37	38444-90-5	0.0000013	J	0.0085		mg/kg	SB404 (7/16/2021)	2 - 4	20/30	67%	0.0000019 – 0.0000096	0.0085	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-38	53555-66-1	0.0000029		0.000039		mg/kg	SA-SB316 (11/8/2019)	2 - 4	4/30	13%	0.0000019 – 0.0011	0.000039	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-39	38444-88-1	0.0000011	J	0.0000099		mg/kg	SB407 (7/15/2021)	2 - 4	3/30	10%	0.0000019 – 0.0011	0.0000099	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-4	13029-08-8	0.0000034		0.013		mg/kg	SB404 (7/16/2021)	2 - 4	15/30	50%	0.0000019 – 0.0000096	0.013	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-40	38444-93-8	0.0000042		0.0029		mg/kg	SA-SB316 (11/8/2019)	2 - 4	8/14	57%	0.000002 – 0.000002	0.0029	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-40/41/71	38444-93-8/526~	0.00015		0.016		mg/kg	SB404 (7/16/2021)	2 - 4	5/9	56%	0.000027 – 0.000029	0.016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-40/71	NOB20161110_001	0.0000014	J	0.0044		mg/kg	SA-SB320 (11/25/2019)	2 - 4	7/7	100%	N/A	0.0044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-41	52663-59-9	0.0000015	J	0.0012		mg/kg	SA-SB320 (11/25/2019)	2 - 4	5/7	71%	0.0000019 – 0.000002	0.0012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-41/64/71/72	52663-59-9/526~	0.0000025	J	0.012		mg/kg	SA-SB316 (11/8/2019)	2 - 4	11/14	79%	0.000008 – 0.000008	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-42	36559-22-5	0.0000029	J	0.0069		mg/kg	SB404 (7/16/2021)	2 - 4	11/16	69%	0.0000019 – 0.0000096	0.0069	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-42/59	36559-22-5/744~	0.0000016	J	0.0058		mg/kg	SA-SB316 (11/8/2019)	2 - 4	10/14	71%	0.000004 – 0.000004	0.0058	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-43	70362-46-8	0.0000014	J	0.00054	J	mg/kg	SA-SB320 (11/25/2019)	2 - 4	5/16	31%	0.0000019 – 0.000078	0.00054	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-43/49	70362-46-8/414~	0.0000013	J	0.012		mg/kg	SA-SB316 (11/8/2019)	2 - 4	12/14	86%	0.000004 – 0.000004	0.012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Subsurface Soil, > 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (> 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-44	41464-39-5	0.0000016	J	0.014		mg/kg	SA-SB316 (11/8/2019)	2 - 4	12/14	86%	0.000002 – 0.000002	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-44/47/65	41464-39-5/243~	0.000015		0.032		mg/kg	SB404 (7/16/2021)	2 - 4	11/16	69%	0.0000058 – 0.000029	0.032	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-45	70362-45-7	0.0000058		0.0033		mg/kg	SA-SB316 (11/8/2019)	2 - 4	8/14	57%	0.000002 – 0.000002	0.0033	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-45/51	70362-45-7/681~	0.000001	J	0.0062		mg/kg	SB404 (7/16/2021)	2 - 4	13/16	81%	0.0000039 – 0.000019	0.0062	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-46	41464-47-5	0.00000049	J	0.002		mg/kg	SB404 (7/16/2021)	2 - 4	17/30	57%	0.0000019 – 0.0011	0.002	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-47	2437-79-8	0.0000016	J	0.0055		mg/kg	SA-SB316 (11/8/2019)	2 - 4	11/14	79%	0.000002 – 0.000002	0.0055	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-48	70362-47-9	0.0000015	J	0.0042		mg/kg	SB404 (7/16/2021)	2 - 4	11/16	69%	0.0000019 – 0.0000096	0.0042	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-48/75	70362-47-9/325~	0.0000033	J	0.002		mg/kg	SA-SB316 (11/8/2019)	2 - 4	8/14	57%	0.000004 – 0.000004	0.002	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-49/69	41464-40-8/602~	0.0000011	J	0.026		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.000019 – 0.000019	0.026	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-5	16605-91-7	0.000002		0.019		mg/kg	SB404 (7/16/2021)	2 - 4	4/30	13%	0.0000019 – 0.0011	0.019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-50	62796-65-0	0.0000014	J	0.000047		mg/kg	SA-SB316 (11/8/2019)	2 - 4	4/14	29%	0.000002 – 0.000002	0.000047	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-50/53	62796-65-0/414~	0.0000005	J	0.0092		mg/kg	SB404 (7/16/2021)	2 - 4	13/16	81%	0.000019 – 0.000019	0.0092	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-51	68194-04-7	0.0000017	J	0.00098		mg/kg	SA-SB316 (11/8/2019)	2 - 4	8/14	57%	0.000002 – 0.000002	0.00098	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-52	35693-99-3	0.000014		0.17		mg/kg	SB404 (7/16/2021)	2 - 4	13/16	81%	0.0000089 – 0.0000095	0.17	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-52/69	35693-99-3/602~	0.0000031	J	0.019		mg/kg	SA-SB316 (11/8/2019)	2 - 4	12/14	86%	0.000004 – 0.000004	0.019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-53	41464-41-9	0.0000054		0.0033		mg/kg	SA-SB316 (11/8/2019)	2 - 4	8/14	57%	0.000002 – 0.000002	0.0033	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-54	15968-05-5	0.00000031	J	0.00031		mg/kg	SB404 (7/16/2021)	2 - 4	9/30	30%	0.0000019 – 0.0011	0.00031	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-55	74338-24-2	0.00000063	J	0.00035		mg/kg	SA-SB316 (11/8/2019)	2 - 4	12/30	40%	0.0000019 – 0.000078	0.00035	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-56	41464-43-1	0.0000022		0.016		mg/kg	SB404 (7/16/2021)	2 - 4	10/16	63%	0.0000089 – 0.0000096	0.016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-56/60	41464-43-1/330~	0.0000023	J	0.0093		mg/kg	SA-SB316 (11/8/2019)	2 - 4	11/14	79%	0.000004 – 0.000004	0.0093	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-57	70424-67-8	0.0000054		0.000083		mg/kg	SA-SB316 (11/8/2019)	2 - 4	5/30	17%	0.0000019 – 0.0011	0.000083	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-58	41464-49-7	0.0000016	J	0.00027		mg/kg	SB407 (7/15/2021)	2 - 4	8/30	27%	0.000002 – 0.0011	0.00027	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-59/62/75	74472-33-6/542~	0.0000011	J	0.0017		mg/kg	SB404 (7/16/2021)	2 - 4	10/16	63%	0.0000058 – 0.000029	0.0017	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-6	25569-80-6	0.0000013	J	0.0048		mg/kg	SB404 (7/16/2021)	2 - 4	15/30	50%	0.0000019 – 0.000019	0.0048	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-60	33025-41-1	0.00000099	J	0.008		mg/kg	SB404 (7/16/2021)	2 - 4	12/16	75%	0.0000095 – 0.0000096	0.008	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-61/70	33284-53-6/325~	0.0000035	J	0.061		mg/kg	SB404 (7/16/2021)	2 - 4	17/23	74%	0.000004 – 0.000039	0.061	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-61/70/74/76	TTNUS817	0.000008		0.025		mg/kg	SA-SB320 (11/25/2019)	2 - 4	7/7	100%	N/A	0.025	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-62	54230-22-7	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-63	74472-34-7	0.00000088	J	0.001		mg/kg	SB404 (7/16/2021)	2 - 4	16/30	53%	0.0000019 – 0.0000096	0.001	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-64	52663-58-8	0.0000019		0.011		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.0000095 – 0.0000095	0.011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-65	33284-54-7	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-66	32598-10-0	0.0000045		0.037		mg/kg	SB404 (7/16/2021)	2 - 4	13/16	81%	0.0000089 – 0.0000095	0.037	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-66/76	32598-10-0/703~	0.0000021	J	0.02		mg/kg	SA-SB316 (11/8/2019)	2 - 4	12/14	86%	0.000004 – 0.000004	0.02	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-67	73575-53-8	0.00000069	J	0.00079		mg/kg	SB404 (7/16/2021)	2 - 4	16/30	53%	0.0000019 – 0.000019	0.00079	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-68	73575-52-7	0.00000067	J	0.00015		mg/kg	SB404 (7/16/2021)	2 - 4	11/30	37%	0.0000019 – 0.0011	0.00015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-7	33284-50-3	0.0000017	J	0.00078		mg/kg	SB404 (7/16/2021)	2 - 4	10/30	33%	0.0000019 – 0.0011	0.00078	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-72	41464-42-0	0.00000098	J	0.00044		mg/kg	SB404 (7/16/2021)	2 - 4	6/16	38%	0.0000019 – 0.0011	0.00044	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-73	74338-23-1	0.0000014	J	0.00015		mg/kg	SA-SB316 (11/8/2019)	2 - 4	6/30	20%	0.0000019 – 0.0011	0.00015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-74	32690-93-0	0.0000015	J	0.0082		mg/kg	SA-SB316 (11/8/2019)	2 - 4	12/14	86%	0.000002 – 0.000002	0.0082	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-77	32598-13-3	0.00000067	J	0.0034		mg/kg	SB404 (7/16/2021)	2 - 4	23/30	77%	0.00000042 – 0.0000046	0.0034	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-78	70362-49-1	0.0000029		0.000072		mg/kg	SA-SB319 (11/7/2019)	5 - 7	4/30	13%	0.0000019 – 0.0011	0.000072	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-79	41464-48-6	0.00000063	J	0.0025		mg/kg	SA-SB320 (11/25/2019)	2 - 4	12/30	40%	0.0000019 – 0.000078	0.0025	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-8	34883-43-7	0.00000094	J	0.008		mg/kg	SA-SB320 (11/25/2019)	2 - 4	17/30	57%	0.0000019 – 0.000078	0.008	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-80	33284-52-5	N/A		N/A		mg/kg	N/A	N/A	0/30	0%	0.0000019 – 0.0011	0.0011	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-81	70362-50-4	0.000001	J	0.0005		mg/kg	SA-SB319 (11/7/2019)	5 - 7	13/30	43%	0.00000036 – 0.0038	0.0005	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
PCB-82	52663-62-4	0.00000073	J	0.008		mg/kg	SB404 (7/16/2021)	2 - 4	21/30	70%	0.000002 – 0.0000096	0.008	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-83	60145-20-2	0.000002		0.0078		mg/kg	SA-SB320 (11/25/2019)	2 - 4	7/7	100%	N/A	0.0078	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-83/112	60145-20-2/744~	0.000003	J	0.0015		mg/kg	SA-SB319 (11/7/2019)	5 - 7	8/14	57%	0.000004 – 0.000004	0.0015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-83/99	60145-20-2/383~	0.00093		0.067		mg/kg	SB404 (7/16/2021)	2 - 4	5/9	56%	0.000018 – 0.000019	0.067	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-84	52663-60-2	0.0000012	J	0.066		mg/kg	SB404 (7/16/2021)	2 - 4	14/16	88%	0.0000095 – 0.0000095	0.066	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-84/92	52663-60-2/526~	0.0000016	J	0.023		mg/kg	SA-SB316 (11/8/2019)	2 - 4	13/14	93%	0.000004 – 0.000004	0.023	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-85/116	65510-45-4/182~	0.0000012	J	0.016		mg/kg	SB404 (7/16/2021)	2 - 4	16/23	70%	0.000004 – 0.000029	0.016	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-85/116/117	TTNUS799	0.0000059		0.0012	J	mg/kg	SA-SB320 (11/25/2019)	2 - 4	6/7	86%	0.0000058 – 0.0000058	0.0012	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-86	55312-69-1	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-86/87/97/109/119/125	55312-69-1/383~	0.000029		0.26		mg/kg	SB404 (7/16/2021)	2 - 4	12/16	75%	0.000054 – 0.000058	0.26	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical

Table A-2.3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Subsurface Soil, > 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (> 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
PCB-87/117/125	38380-02-8/681~	0.0000014	J	0.018		mg/kg	SA-SB319 (11/7/2019)	5 - 7	13/14	93%	0.000006 – 0.000006	0.018	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-88/91	55215-17-3/681~	0.00000077	J	0.01		mg/kg	SB404 (7/16/2021)	2 - 4	24/30	80%	0.000004 – 0.000019	0.01	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-89	73575-57-2	0.0000024		0.00098		mg/kg	SB404 (7/16/2021)	2 - 4	8/30	27%	0.0000019 – 0.0011	0.00098	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-9	34883-39-1	0.0000022		0.0015		mg/kg	SB404 (7/16/2021)	2 - 4	10/30	33%	0.0000019 – 0.0011	0.0015	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-90/101	68194-07-0/376~	0.000064		1.7		mg/kg	SB404 (7/16/2021)	2 - 4	6/9	67%	0.000027 – 0.000028	1.7	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-90/101/113	TTNUS619	0.00012		0.47		mg/kg	SA-SB320 (11/25/2019)	2 - 4	7/7	100%	N/A	0.47	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-92	52663-61-3	0.0000015	J	0.26		mg/kg	SB404 (7/16/2021)	2 - 4	15/16	94%	0.0000095 – 0.0000095	0.26	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-93	73575-56-1	N/A		N/A		mg/kg	N/A	N/A	0/14	0%	0.000002 – 0.000002	0.000002	CRQL	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-93/100	73575-56-1/394~	0.00000056	J	0.00000056	J	mg/kg	SA-SB322 (11/22/2019)	2 - 4	1/7	14%	0.0000039 – 0.0022	0.00000056	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-93/95/98/100/102	73575-56-1/383~	0.000051		1.5		mg/kg	SB404 (7/16/2021)	2 - 4	6/9	67%	0.000045 – 0.000047	1.5	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-94	73575-55-0	0.0000018	J	0.00063		mg/kg	SB404 (7/16/2021)	2 - 4	9/30	30%	0.0000019 – 0.0011	0.00063	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-95	38379-99-6	0.0000052		0.38		mg/kg	SA-SB320 (11/25/2019)	2 - 4	20/21	95%	0.000002 – 0.000002	0.38	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-96	73575-54-9	0.00000015	J	0.0011		mg/kg	SB404 (7/16/2021)	2 - 4	13/30	43%	0.0000019 – 0.0011	0.0011	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-97	41464-51-1	0.0000018	J	0.014		mg/kg	SA-SB319 (11/7/2019)	5 - 7	12/14	86%	0.000002 – 0.000002	0.014	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-98/102	60233-25-2/681~	0.0000084		0.00078	J	mg/kg	SA-SB320 (11/25/2019)	2 - 4	4/21	19%	0.0000039 – 0.000004	0.00078	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCB-99	38380-01-7	0.0000025		0.019		mg/kg	SA-SB319 (11/7/2019)	5 - 7	19/21	90%	0.000002 – 0.000002	0.019	MDC	N/A	See Aroclors		N/A	N/A	--	No	Aroclor data used to evaluate chemical
PCBC TEQ MAMMAL HALFND	CALC029P	4.07E-08		8.80E-05		mg/kg	SB404 (7/16/2021)	2 - 4	29/30	97%	7.10E-07 – 7.10E-07	8.80E-05	MDC	N/A	4.80E-06	*	RSL	N/A	--	Yes	MDC > SL
Total DiCB	25512-42-9	0.0000016	J	0.051	J	mg/kg	SB404 (7/16/2021)	2 - 4	25/30	83%	0 – 0.00012	0.051	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total HpCB	28655-71-2	0.000018	J	18	J	mg/kg	SB404 (7/16/2021)	2 - 4	29/30	97%	N/A	18	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total HxCB	26601-64-9	0.000027	J	21	J	mg/kg	SB404 (7/16/2021)	2 - 4	29/30	97%	N/A	21	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total MoCB	27323-18-8	0.00000053	J	0.0086	J	mg/kg	SA-SB317 (11/8/2019)	5 - 7	21/30	70%	0 – 0.000029	0.0086	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total NoCB	53742-07-7	0.0000011	J	0.29	J	mg/kg	SB404 (7/16/2021)	2 - 4	28/30	93%	0 – 0.000028	0.29	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total OcCB	55722-26-4	0.0000017	J	4.4	J	mg/kg	SB404 (7/16/2021)	2 - 4	29/30	97%	N/A	4.4	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total PeCB	25429-29-2	0.0000067	J	5.4	J	mg/kg	SB404 (7/16/2021)	2 - 4	29/30	97%	N/A	5.4	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total TeCB	26914-33-0	0.0000055	J	0.42	J	mg/kg	SB404 (7/16/2021)	2 - 4	28/30	93%	N/A	0.42	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Total TrCB	25323-68-6	0.00000064	J	0.15	J	mg/kg	SB404 (7/16/2021)	2 - 4	27/30	90%	N/A	0.15	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
TOTAL PCB HOMOLOGS HALFND	CALCHOMOL	0.00014254		49.7189		mg/kg	SB404 (7/16/2021)	2 - 4	30/30	100%	N/A	49.7189	MDC	N/A	N/A		N/A	N/A	--	No	Qualitative Evaluation
Dioxins and Furans																					
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001-02-0	0.00000091	J	0.00074		mg/kg	SB404 (7/16/2021)	2 - 4	14/25	56%	0.00000031 – 0.000002	0.00074	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268-87-9	0.0000026	J	0.0042	J	mg/kg	SB404 (7/16/2021)	2 - 4	25/25	100%	N/A	0.0042	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	0.0000004	J	0.00032		mg/kg	SB404 (7/16/2021)	2 - 4	13/25	52%	0.00000017 – 0.0000022	0.00032	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	0.0000018	J	0.00036		mg/kg	SB404 (7/16/2021)	2 - 4	24/25	96%	0.0000011 – 0.0000011	0.00036	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	0.00000056	J	0.0001		mg/kg	SB404 (7/16/2021)	2 - 4	9/25	36%	0.00000015 – 0.0000022	0.0001	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	0.00000069	J	0.00022		mg/kg	SB404 (7/16/2021)	2 - 4	11/25	44%	0.00000013 – 0.0000016	0.00022	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	0.00000057	J	0.000003	J	mg/kg	SB404 (7/16/2021)	2 - 4	4/25	16%	0.00000014 – 0.0000015	0.000003	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	0.00000057	J	0.000038	J-	mg/kg	SB404 (7/16/2021)	2 - 4	9/25	36%	0.000000093 – 0.0000019	0.000038	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	0.00000025	J	0.000015		mg/kg	SA-SB320 (11/25/2019)	2 - 4	8/25	32%	0.00000014 – 0.0000012	0.000015	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	0.00000035	J	0.000016		mg/kg	SB404 (7/16/2021)	2 - 4	6/25	24%	0.00000016 – 0.0000015	0.000016	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	0.00000021	JZ	0.0000063		mg/kg	SA-SB320 (11/25/2019)	2 - 4	8/25	32%	0.00000015 – 0.0000024	0.0000063	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	0.00000037	J	0.000059	J-	mg/kg	SB403 (7/16/2021)	2 - 4	11/25	44%	0.00000015 – 0.0000016	0.000059	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	0.00000048	J	0.000018	Z	mg/kg	SB404 (7/16/2021)	2 - 4	6/25	24%	0.00000017 – 0.0000019	0.000018	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	0.00000058	J	0.000038		mg/kg	SB404 (7/16/2021)	2 - 4	9/25	36%	0.000000091 – 0.00000095	0.000038	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	0.0000002	JZ	0.00005		mg/kg	SB404 (7/16/2021)	2 - 4	10/25	40%	0.00000014 – 0.000001	0.00005	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	0.00000038	J	0.000024		mg/kg	SB404 (7/16/2021)	2 - 4	14/25	56%	0.000000061 – 0.00000035	0.000024	MDC	N/A	See TEQ		N/A	N/A	--	No	TEQ used to evaluate chemical
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	0.0000002	Z	0.00000032	Z	mg/kg	SA-SB320 (11/25/2019)	2 - 4	3/25	12%	0.000000064 – 0.00000086	0.00000032	MDC	N/A	See TEQ		N/A	0.0000052	WVDEP	No	TEQ used to evaluate chemical
DIOXIN TEQ MAMMAL HALFND	CALC029D	2.97E-07		7.90E-05		mg/kg	SB404 (7/16/2021)	2 - 4	25/25	100%	N/A	7.90E-05	MDC	N/A	4.80E-06	*	RSL	N/A	--	Yes	MDC > SL (CRQL N/A)
Metals																					
Aluminum	7429-90-5	1790		19000		mg/kg	SB450 (7/15/2021)	2 - 4	30/30	100%	N/A	19000	MDC	N/A	7700		RSL	77000	WVDEP	Yes	MDC > SL (CRQL N/A)
Antimony	7440-36-0	0.21	J	1.9		mg/kg	SA-SB310 (11/7/2019)	2 - 4	10/30	33%	1 – 7	1.9	MDC	N/A	3.1		RSL	31	WVDEP	No	MDC ≤ SL < CRQL
Arsenic	7440-38-2	0.7	J	30		mg/kg	SB404 (7/16/2021)	2 - 4	30/30	100%	N/A	30	MDC	N/A	0.68		RSL	0.68	WVDEP	Yes	MDC > SL (CRQL N/A)
Barium	7440-39-3	39.6		274		mg/kg	SA-SB317 (11/8/2019)	5 - 7	30/30	100%	N/A	274	MDC	N/A	1500		RSL	15000	WVDEP	No	MDC ≤ SL (CRQL N/A)
Beryllium	7440-41-7	0.25	J	2.4	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	30/30	100%	N/A	2.4	MDC	N/A	16		RSL	160	WVDEP	No	MDC ≤ SL (CRQL N/A)
Cadmium	7440-43-9	0.067	J	0.72		mg/kg	SA-SB312 (11/7/2019)	2 - 4	21/30	70%	0.51 – 0.6	0.72	MDC	N/A	0.71		RSL	37	WVDEP	Yes	MDC > SL
Calcium	7440-70-2	97	J	40000		mg/kg	SB407 (7/15/2021)	2 - 4	26/30	87%	550 – 590	40000	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Chromium	7440-47-3	4		25.8	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	30/30	100%	N/A	25.8	MDC	N/A	0.3	*	RSL	0.3	WVDEP	Yes	MDC > SL (CRQL N/A)

Table A-2.3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Subsurface Soil, > 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil (> 2 feet)

Chemical	CASRN	Minimum Detected Concentration		Maximum Detected Concentration		Units	Location of Maximum	Depth (ft bgs)	Detection Frequency		Range of Reporting Limits	Screening Concentration		Background Value	Screening Level [1, 2]		Source	Potential ARAR [3]	Source	COPC Flag (Yes/No)	Rationale for Selection/Deletion
Cobalt	7440-48-4	1.6		28.9	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	30/30	100%	N/A	28.9	MDC	N/A	2.3		RSL	23	WVDEP	Yes	MDC > SL (CRQL N/A)
Copper	7440-50-8	2.7	J	210		mg/kg	SB404 (7/16/2021)	2 - 4	30/30	100%	N/A	210	MDC	N/A	310		RSL	3100	WVDEP	No	MDC ≤ SL (CRQL N/A)
Iron	7439-89-6	5300		43800		mg/kg	SA-SB320 (11/25/2019)	2 - 4	30/30	100%	N/A	43800	MDC	N/A	5500		RSL	55000	WVDEP	Yes	MDC > SL (CRQL N/A)
Lead	7439-92-1	5.4		160		mg/kg	SB404 (7/16/2021)	2 - 4	30/30	100%	N/A	160	MDC	N/A	400		RSL	400	WVDEP	No	MDC ≤ SL (CRQL N/A)
Magnesium	7439-95-4	222	J	4700		mg/kg	SB407 (7/15/2021)	2 - 4	28/30	93%	560 – 580	4700	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Manganese	7439-96-5	32.3		815		mg/kg	SA-SB319 (11/7/2019)	5 - 7	30/30	100%	N/A	815	MDC	N/A	180		RSL	1800	WVDEP	Yes	MDC > SL (CRQL N/A)
Mercury	7439-97-6	0.01	J	0.21	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	19/30	63%	0.04 – 0.12	0.21	MDC	N/A	1.1	*	RSL	3.1	WVDEP	No	CRQL and MDC ≤ SL
Nickel	7440-02-0	3.8		56.7	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	30/30	100%	N/A	56.7	MDC	N/A	150		RSL	1500	WVDEP	No	MDC ≤ SL (CRQL N/A)
Potassium	7440-09-7	620		2800		mg/kg	SB404 (7/16/2021)	2 - 4	24/30	80%	550 – 623	2800	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Selenium	7782-49-2	0.17	J	2.4	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	19/30	63%	2.7 – 4.1	2.4	MDC	N/A	39		RSL	390	WVDEP	No	CRQL and MDC ≤ SL
Silver	7440-22-4	0.061	J	0.16	J	mg/kg	SA-SB369 (11/21/2019)	5 - 7	4/30	13%	0.51 – 1.2	0.16	MDC	N/A	39		RSL	390	WVDEP	No	CRQL and MDC ≤ SL
Sodium	7440-23-5	8.8	J	190	J	mg/kg	SA-SB316 (11/8/2019)	2 - 4	14/30	47%	490 – 607	190	MDC	N/A	Nutrient		N/A	Nutrient	--	No	Classified as an essential nutrient
Thallium	7440-28-0	0.06	J	0.42	J	mg/kg	SA-SB325 (11/22/2019)	7 - 8.8	9/30	30%	0.52 – 2.9	0.42	MDC	N/A	0.078		RSL	0.78	WVDEP	Yes	MDC > SL
Vanadium	7440-62-2	5.1	J	22.6		mg/kg	SA-SB318 (11/8/2019)	4 - 6	30/30	100%	N/A	22.6	MDC	N/A	39	*	RSL	460	WVDEP	No	MDC ≤ SL (CRQL N/A)
Zinc	7440-66-6	9.9		166		mg/kg	SA-SB319 (11/7/2019)	5 - 7	30/30	100%	N/A	166	MDC	N/A	2300		RSL	23000	WVDEP	No	MDC ≤ SL (CRQL N/A)
Cyanide																					
Cyanide	57-12-5	0.053	J	0.76		mg/kg	SA-SB319 (11/7/2019)	5 - 7	14/17	82%	0.51 – 0.57	0.76	MDC	N/A	2.3		RSL	N/A	--	No	CRQL and MDC ≤ SL

Notes:
% = Percent
ARAR = Applicable or Relevant and Appropriate Requirements
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
CRQL = Contract Required Quantitation Limit
ft bgs = feet below gound surface
J = Estimated Concentration (+/- indicates a positive or negative bia, respectively)
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
TEQ = Toxicity Equivalence
USEPA = United States Environmental Protection Agency
WVDEP = West Virginia Department of Environmental Protection
(1) Site data screened against USEPA Residential Soil RSLs, last updated November 2021 (TR = 1E-6, THQ = 0.1).
(2) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see **Table 2-4**).
(3) As indicated in the WVDEP Voluntary Remediation Program technical guidance, residential soil "De Minimis" values pursuant to 60CSR9 (effective 12/2/2021) were selected as potential ARARs.

Table A-2.4
Surrogate Chemicals Used within the Human Health Risk Assessment
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Chemical	CASRN	Surrogate	CASRN
1,3-Dichlorobenzene	541-73-1	1,2-Dichlorobenzene	95-50-1
cis-1,3-Dichloropropene	10061-01-5	1,3-Dichloropropene	542-75-6
m,p-Xylene	179601-23-1	Xylenes, Total	1330-20-7
Methylcyclohexane	108-87-2	Cyclohexane	110-82-7
trans-1,3-Dichloropropene	10061-02-6	1,3-Dichloropropene	542-75-6
2-Nitrophenol	88-75-5	Phenol	108-95-2
3 & 4 Methylphenol	15831-10-4	Cresols	1319-77-3
3-Nitroaniline	99-09-2	2-Nitroaniline	88-74-4
4-Nitrophenol	100-02-7	Phenol	108-95-2
delta-BHC	319-86-8	alpha-BHC	319-84-6
Endosulfan I	959-98-8	Endosulfan	115-29-7
Endosulfan II	33213-65-9	Endosulfan	115-29-7
Endrin Aldehyde	7421-93-4	Endrin	72-20-8
Endrin Ketone	53494-70-5	Endrin	72-20-8
Aroclor 1262	37324-23-5	Polychlorinated Biphenyls (high risk)	1336-36-3
Aroclor 1268	11100-14-4	Polychlorinated Biphenyls (high risk)	1336-36-3
PCBC TEQ MAMMAL	CALC016P	2,3,7,8-TCDD	1746-01-6
DIOXIN TEQ MAMMAL	CALC016D	2,3,7,8-TCDD	1746-01-6
Chromium	7440-47-3	Chromium, Hexavalent	18540-29-9
Mercury	7439-97-6	Elemental Mercury	7439-97-6
Vanadium	7440-62-2	Vanadium and Compounds	7440-62-2

Notes:
CASRN = Chemical Abstracts Service Registry Number
PCBC = Polychlorinated Biphenyl Congener
TCDD = Tetrachlorodibenzodioxin
TEQ = Toxicity Equivalence

Table A-3.1
Exposure Point Concentration Summary (Direct Contact – Site-Wide; Surface Soil, 0 – 0.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: 0 – 0.5 feet

COPC	Units	Detection Frequency [1]	Arithmetic Mean [1,2]	95% UCL (Distribution) [1]		Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Semi-Volatile Organic Compounds (SVOCs)										
Benzo(a)pyrene	mg/kg	30/30	0.0741	0.114	(G)	0.29	0.114	mg/kg	UCL	(3)
Polychlorinated Biphenyls (PCBs)										
Aroclor 1260	mg/kg	8/9	0.299	1.659	(G)	1.6	1.6	mg/kg	Max	(4)
PCBs - Congeners										
PCBC TEQ MAMMAL HALFND	mg/kg	30/30	0.000017278	2.9025E-05	(G)	0.000113309	0.000029025	mg/kg	UCL	(3)
Dioxins and Furans										
DIOXIN TEQ MAMMAL HALFND	mg/kg	24/24	0.000013068	2.0772E-05	(G)	0.000090042	0.000020772	mg/kg	UCL	(3)
Metals										
Aluminum	mg/kg	30/30	7565	8541	(N)	15700	8541	mg/kg	UCL	(5)
Arsenic	mg/kg	30/30	7.69	8.639	(N)	14.6	8.639	mg/kg	UCL	(5)
Chromium	mg/kg	30/30	11.61	12.58	(N)	18	12.58	mg/kg	UCL	(5)
Cobalt	mg/kg	30/30	9.613	11.02	(N)	23.6	11.02	mg/kg	UCL	(5)
Iron	mg/kg	30/30	20683	25030	(L)	77700	25030	mg/kg	UCL	(6)
Manganese	mg/kg	30/30	404.4	472.4	(N)	1140	472.4	mg/kg	UCL	(5)
Thallium	mg/kg	10/30	0.11	0.144	(N)	0.25	0.144	mg/kg	UCL	(5)

Notes:
COPC = Chemical of Potential Concern
KM = Kaplan Meier
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more with three (3) detections.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Goodness-of-Fit test indicates data are gamma distributed
(4) UCL greater than the maximum detected concentration; maximum detect selected as exposure point concentration.
(5) Goodness-of-Fit test indicates data are normally distributed.
(6) Goodness-of-Fit test indicates data are lognormally distributed.

Table A-3.2a
Exposure Point Concentration Summary (Direct Contact – Site-Wide; Surface and Near Surface Soil, 0 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface and Near Surface Soil
Exposure Point: 0 – 2 feet

COPC	Units	Detection Frequency [1]	Arithmetic Mean [1,2]	95% UCL (Distribution) [1]		Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Semi-Volatile Organic Compounds (SVOCs)										
Benzo(a)anthracene	mg/kg	58/60	0.166	0.329	(L)	3.9	0.329	mg/kg	UCL	(3)
Benzo(a)pyrene	mg/kg	58/60	0.14	0.295	(L)	3.3	0.295	mg/kg	UCL	(3)
Benzo(b)fluoranthene	mg/kg	58/60	0.251	0.531	(L)	5.7	0.531	mg/kg	UCL	(3)
Indeno(1,2,3-cd)pyrene	mg/kg	58/60	0.0778	0.161	(L)	1.5	0.161	mg/kg	UCL	(3)
Polychlorinated Biphenyls (PCBs)										
Aroclor 1254	mg/kg	2/31	N/A	N/A	N/A	0.551	0.551	mg/kg	Max	(1)
Aroclor 1260	mg/kg	24/31	1.177	1.582	(L)	24	1.582	mg/kg	UCL	(3)
PCBs - Congeners										
PCBC TEQ MAMMAL HALFND	mg/kg	60/60	0.000015193	2.1487E-05	(G)	0.000113309	0.000021487	mg/kg	UCL	(5)
Dioxins and Furans										
DIOXIN TEQ MAMMAL HALFND	mg/kg	48/48	9.1678E-06	1.3649E-05	(L)	0.000090042	0.000013649	mg/kg	UCL	(3)
Metals										
Aluminum	mg/kg	60/60	7992	8700	(N)	19000	8700	mg/kg	UCL	(6)
Antimony	mg/kg	33/60	0.828	1.036	(G)	4.4	1.036	mg/kg	UCL	(5)
Arsenic	mg/kg	60/60	11.23	12.98	(L)	82.8	12.98	mg/kg	UCL	(3)
Cadmium	mg/kg	54/60	0.332	0.521	(NP)	2.2	0.521	mg/kg	UCL	(4)
Chromium	mg/kg	60/60	14.37	15.76	(G)	43.9	15.76	mg/kg	UCL	(5)
Cobalt	mg/kg	60/60	10.02	11.15	(G)	28.1	11.15	mg/kg	UCL	(5)
Iron	mg/kg	59/59	21653	24527	(L)	77700	24527	mg/kg	UCL	(3)
Manganese	mg/kg	60/60	424.7	492.2	(G)	2630	492.2	mg/kg	UCL	(5)
Thallium	mg/kg	20/60	0.134	0.164	(N)	0.34	0.164	mg/kg	UCL	(6)

Notes:
COPC = Chemical of Potential Concern
KM = Kaplan Meier
mg/kg = milligram per kilogram
N/A = Not Applicable
UCL = Upper Confidence Limit

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more with three (3) detections.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Goodness-of-Fit test indicates data are lognormally distributed.
(4) Goodness-of-Fit test indicates data have no discernible distribution.
(5) Goodness-of-Fit test indicates data are gamma distributed.
(6) Goodness-of-Fit test indicates data are normally distributed.

Table A-3.2b
Exposure Point Concentration Summary (Direct Contact – Site-Wide with Hotspot; Surface and Near Surface Soil, 0 – 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface and Near Surface Soil
Exposure Point: 0 – 2 feet

COPC	Units	Detection Frequency [1]	Arithmetic Mean [1,2]	95% UCL (Distribution) [1]		Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Semi-Volatile Organic Compounds (SVOCs)										
Benzo(a)anthracene	mg/kg	58/60	0.166	0.329	(L)	3.9	0.329	mg/kg	UCL	(3)
Benzo(a)pyrene	mg/kg	58/60	0.14	0.295	(L)	3.3	0.295	mg/kg	UCL	(3)
Benzo(b)fluoranthene	mg/kg	58/60	0.251	0.531	(L)	5.7	0.531	mg/kg	UCL	(3)
Indeno(1,2,3-cd)pyrene	mg/kg	58/60	0.0778	0.161	(L)	1.5	0.161	mg/kg	UCL	(3)
Polychlorinated Biphenyls (PCBs)										
Aroclor 1254	mg/kg	2/31	N/A	N/A	N/A	0.551	0.551	mg/kg	Max	(1)
Aroclor 1260	mg/kg	24/31	1.177	1.582	(L)	24	24	mg/kg	Max	(4)
PCBs - Congeners										
PCBC TEQ MAMMAL HALFND	mg/kg	60/60	0.000015193	2.1487E-05	(G)	0.000113309	0.000021487	mg/kg	UCL	(6)
Dioxins and Furans										
DIOXIN TEQ MAMMAL HALFND	mg/kg	48/48	9.1678E-06	1.3649E-05	(L)	0.000090042	0.000013649	mg/kg	UCL	(6)
Metals										
Aluminum	mg/kg	60/60	7992	8700	(N)	19000	8700	mg/kg	UCL	(7)
Antimony	mg/kg	33/60	0.828	1.036	(G)	4.4	1.036	mg/kg	UCL	(6)
Arsenic	mg/kg	60/60	11.23	12.98	(L)	82.8	12.98	mg/kg	UCL	(3)
Cadmium	mg/kg	54/60	0.332	0.521	(NP)	2.2	0.521	mg/kg	UCL	(5)
Chromium	mg/kg	60/60	14.37	15.76	(G)	43.9	15.76	mg/kg	UCL	(6)
Cobalt	mg/kg	60/60	10.02	11.15	(G)	28.1	11.15	mg/kg	UCL	(6)
Iron	mg/kg	59/59	21653	24527	(L)	77700	24527	mg/kg	UCL	(3)
Manganese	mg/kg	60/60	424.7	492.2	(G)	2630	492.2	mg/kg	UCL	(6)
Thallium	mg/kg	20/60	0.134	0.164	(N)	0.34	0.164	mg/kg	UCL	(7)

Notes:
COPC = Chemical of Potential Concern
KM = Kaplan Meier
mg/kg = milligram per kilogram
N/A = Not Applicable
UCL = Upper Confidence Limit

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more with three (3) detections.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Goodness-of-Fit test indicates data are lognormally distributed.
(4) Maximum detected concentration retained as exposure point concentration to evaluate presence of a potential hot spot.
(5) Goodness-of-Fit test indicates data have no discernible distribution.
(6) Goodness-of-Fit test indicates data are gamma distributed.
(7) Goodness-of-Fit test indicates data are normally distributed.

Table A-3.3a
Exposure Point Concentration Summary (Direct Contact – Site-Wide; Total Soil, 0 – 8.8 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil
Exposure Point: 0 – 8.8 feet

COPC	Units	Detection Frequency [1]	Arithmetic Mean [1,2]	95% UCL (Distribution) [1]		Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Semi-Volatile Organic Compounds (SVOCs)										
1,2,4,5-Tetrachlorobenzene	mg/kg	2/90	0.0703	0.121	(NP)	0.81	0.121	mg/kg	UCL	(3)
Benzo(a)anthracene	mg/kg	82/90	0.212	0.509	(L)	5.7	0.509	mg/kg	UCL	(4)
Benzo(a)pyrene	mg/kg	79/90	0.196	0.342	(L)	6.1	0.342	mg/kg	UCL	(4)
Benzo(b)fluoranthene	mg/kg	82/90	0.329	0.69	(L)	9.5	0.69	mg/kg	UCL	(4)
Dibenz(a,h)anthracene	mg/kg	39/90	0.0169	0.0151	(L)	0.71	0.0151	mg/kg	UCL	(4)
Indeno(1,2,3-cd)pyrene	mg/kg	79/90	0.0907	0.177	(L)	1.7	0.177	mg/kg	UCL	(4)
Pesticides										
Dieldrin	mg/kg	16/85	0.0113	0.00397	(L)	0.75	0.00397	mg/kg	UCL	(4)
Polychlorinated Biphenyls (PCBs)										
Aroclor 1254	mg/kg	7/61	0.0343	0.0617	(G)	0.551	0.0617	mg/kg	UCL	(5)
Aroclor 1260	mg/kg	37/61	0.865	1.179	(L)	24	1.179	mg/kg	UCL	(4)
PCBs - Congeners										
PCBC TEQ MAMMAL HALFND	mg/kg	89/90	0.00001254	2.2823E-05	(NP)	0.000113309	0.000022823	mg/kg	UCL	(3)
Dioxins and Furans										
DIOXIN TEQ MAMMAL HALFND	mg/kg	73/73	8.1684E-06	1.1892E-05	(L)	0.000090042	0.000011892	mg/kg	UCL	(4)
Metals										
Aluminum	mg/kg	90/90	7896	8507	(N)	19000	8507	mg/kg	UCL	(6)
Antimony	mg/kg	43/90	0.78	0.923	(G)	4.4	0.923	mg/kg	UCL	(5)
Arsenic	mg/kg	90/90	10.46	12.16	(L)	82.8	12.16	mg/kg	UCL	(4)
Cadmium	mg/kg	75/90	0.302	0.332	(L)	2.2	0.332	mg/kg	UCL	(4)
Chromium	mg/kg	90/90	13.79	14.84	(G)	43.9	14.84	mg/kg	UCL	(5)
Cobalt	mg/kg	90/90	9.356	10.32	(G)	28.9	10.32	mg/kg	UCL	(5)
Iron	mg/kg	89/89	20330	22423	(L)	77700	22423	mg/kg	UCL	(4)
Manganese	mg/kg	90/90	371.1	419.8	(G)	2630	419.8	mg/kg	UCL	(5)
Thallium	mg/kg	29/90	0.136	0.152	(G)	0.42	0.152	mg/kg	UCL	(5)

Notes:
COPC = Chemical of Potential Concern
KM = Kaplan Meier
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more with three (3) detections.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Goodness-of-Fit test indicates data have no discernible distribution.
(4) Goodness-of-Fit test indicates data are lognormally distributed.
(5) Goodness-of-Fit test indicates data are gamma distributed.
(6) Goodness-of-Fit test indicates data are normally distributed.

Table A-3.3b
Exposure Point Concentration Summary (Direct Contact – Site-Wide with Hotspot; Total Soil, 0 – 8.8 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil
Exposure Point: 0 – 8.8 feet

COPC	Units	Detection Frequency [1]	Arithmetic Mean [1,2]	95% UCL (Distribution) [1]		Maximum Concentration	Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Semi-Volatile Organic Compounds (SVOCs)										
1,2,4,5-Tetrachlorobenzene	mg/kg	2/90	0.0703	0.121	(NP)	0.81	0.121	mg/kg	UCL	(3)
Benzo(a)anthracene	mg/kg	82/90	0.212	0.509	(L)	5.7	0.509	mg/kg	UCL	(4)
Benzo(a)pyrene	mg/kg	79/90	0.196	0.342	(L)	6.1	0.342	mg/kg	UCL	(4)
Benzo(b)fluoranthene	mg/kg	82/90	0.329	0.69	(L)	9.5	0.69	mg/kg	UCL	(4)
Dibenz(a,h)anthracene	mg/kg	39/90	0.0169	0.0151	(L)	0.71	0.0151	mg/kg	UCL	(4)
Indeno(1,2,3-cd)pyrene	mg/kg	79/90	0.0907	0.177	(L)	1.7	0.177	mg/kg	UCL	(4)
Pesticides										
Dieldrin	mg/kg	16/85	0.0113	0.00397	(L)	0.75	0.00397	mg/kg	UCL	(4)
Polychlorinated Biphenyls (PCBs)										
Aroclor 1254	mg/kg	7/61	0.0343	0.0617	(G)	0.551	0.0617	mg/kg	UCL	(5)
Aroclor 1260	mg/kg	37/61	0.865	1.179	(L)	24	24	mg/kg	Max	(6)
PCBs - Congeners										
PCBC TEQ MAMMAL HALFND	mg/kg	89/90	0.00001254	2.2823E-05	(NP)	0.000113309	0.000022823	mg/kg	UCL	(3)
Dioxins and Furans										
DIOXIN TEQ MAMMAL HALFND	mg/kg	73/73	8.1684E-06	1.1892E-05	(L)	0.000090042	0.000011892	mg/kg	UCL	(4)
Metals										
Aluminum	mg/kg	90/90	7896	8507	(N)	19000	8507	mg/kg	UCL	(7)
Antimony	mg/kg	43/90	0.78	0.923	(G)	4.4	0.923	mg/kg	UCL	(5)
Arsenic	mg/kg	90/90	10.46	12.16	(L)	82.8	12.16	mg/kg	UCL	(4)
Cadmium	mg/kg	75/90	0.302	0.332	(L)	2.2	0.332	mg/kg	UCL	(4)
Chromium	mg/kg	90/90	13.79	14.84	(G)	43.9	14.84	mg/kg	UCL	(5)
Cobalt	mg/kg	90/90	9.356	10.32	(G)	28.9	10.32	mg/kg	UCL	(5)
Iron	mg/kg	89/89	20330	22423	(L)	77700	22423	mg/kg	UCL	(4)
Manganese	mg/kg	90/90	371.1	419.8	(G)	2630	419.8	mg/kg	UCL	(5)
Thallium	mg/kg	29/90	0.136	0.152	(G)	0.42	0.152	mg/kg	UCL	(5)

Notes:
COPC = Chemical of Potential Concern
KM = Kaplan Meier
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more with three (3) detections.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Goodness-of-Fit test indicates data have no discernible distribution.
(4) Goodness-of-Fit test indicates data are lognormally distributed.
(5) Goodness-of-Fit test indicates data are gamma distributed.
(6) Maximum detected concentration retained as exposure point concentration to evaluate presence of a potential hot spot.
(7) Goodness-of-Fit test indicates data are normally distributed.

Table A-4.1
Values Used for Daily Intake and Dermally Absorbed Dose Calculations - Incidental Ingestion and Dermal Absorption of Soil
Reasonable Maximum Exposure
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Soil**

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Ingestion	Hypothetical Resident (Future)	Adult	Ingestion of Soil						**Non-Mutagenic Constituents**
				DI	Daily Intake	Calculated	mg/kg-day	See equations	Daily Intake (mg/kg-day) for carcinogens (adult) =
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	$\frac{CS \times IR\text{-}SA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATc}$
				IR-SA	Ingestion Rate, soil - adult	100	mg/day	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				RBA	Relative Bioavailability Factor	Chemical-Specific	unitless	Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2021	Daily Intake (mg/kg-day) for noncarcinogens (adult) =
				FI-S	Fraction Ingested from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	$\frac{CS \times IR\text{-}SA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATnc,a}$
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	
				EDa	Exposure Duration, adult	20	years	USEPA, 2014 (EDr (26 years) - EDc (6 years))	
				BWa	Body Weight, adult	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	Daily Intake (mg/kg-day) for carcinogens (lifetime) = [DI for carcinogens (adult) + DI for carcinogens (child)]
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc,a	Averaging Time, noncarcinogens - adult	7300	days	USEPA, 1989 (ED x 365 days/year)	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
Ingestion	Hypothetical Resident (Future)	Child	Ingestion of Soil						**Non-Mutagenic Constituents**
				DI	Daily Intake	Calculated	mg/kg-day	See equations	Daily Intake (mg/kg-day) for carcinogens (child) =
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	$\frac{CS \times IR\text{-}SC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATc}$
				IR-SC	Ingestion Rate, soil - child	200	mg/day	USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion)	
				RBA	Relative Bioavailability Factor	Chemical-Specific	unitless	Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2021	Daily Intake (mg/kg-day) for noncarcinogens (child) =
				FI-S	Fraction Ingested from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	$\frac{CS \times IR\text{-}SC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATnc,c}$
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	
				EDc	Exposure Duration, child	6	years	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	Daily Intake (mg/kg-day) for carcinogens (lifetime) = [DI for carcinogens (adult) + DI for carcinogens (child)]
				BWc	Body Weight, child	15	kg	USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years))	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc,c	Averaging Time, noncarcinogens - child	2190	days	USEPA, 1989 (ED x 365 days/year)	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
Ingestion	Hypothetical Resident (Future)	Lifetime	Ingestion of Soil						**Mutagenic Constituents**
				DI	Daily Intake	Calculated	mg/kg-day	See equations	Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) =
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	$\frac{CS \times RBA \times FI\text{-}S \times CF1 \times IFSMadj}{ATc}$
				RBA	Relative Bioavailability Factor	Chemical-Specific	unitless	Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2021	
				FI-S	Fraction Ingested from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	Where IFSMadj (mg/kg) =
				CF1	Conversion Factor 1	0.000001	kg/mg	-	$\frac{EF \times IR\text{-}SC}{BW_c} \times \left[(ED_{0-2} \times ADAF_{0-2}) + (ED_{2-6} \times ADAF_{2-6})\right] +$
				IFSMadj	Mutagenic Ingestion Rate - Age-adjusted	166833	mg/kg	See equations	$\frac{EF \times IR\text{-}SA}{BW_a} \times \left[(ED_{6-16} \times ADAF_{6-16}) + (ED_{16-26} \times ADAF_{16-26})\right]$
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	
				IR-SA	Ingestion Rate, soil - adult	100	mg/day	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				IR-SC	Ingestion Rate, soil - child	200	mg/day	USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion)	
				ED0-2	Exposure Duration, 0-2 years	2	years	USEPA, 2005	
				ED2-6	Exposure Duration, 2-6 years	4	years	USEPA, 2005	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ED16-26	Exposure Duration, 16-26 years	10	years	USEPA, 2005	
				ADAF0-2	Age Depend. Adjust. Factor, 0-2 years	10	unitless	USEPA, 2005	

Table A-4.1
Values Used for Daily Intake and Dermally Absorbed Dose Calculations - Incidental Ingestion and Dermal Absorption of Soil
Reasonable Maximum Exposure
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Soil**

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Ingestion	Hypothetical Resident (Future)	Lifetime	Ingestion of Soil	ADAF2-6	Age Depend. Adjust. Factor, 2-6 years	3	unitless	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	
				ADAF16-26	Age Depend. Adjust. Factor, 16-26 years	1	unitless	USEPA, 2005	
				BWa	Body Weight, adult	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	
				BWc	Body Weight, child	15	kg	USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years))	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
Ingestion	Recreator (Current/Future)	Adult	Ingestion of Soil						**Non-Mutagenic Constituents**
				DI	Daily Intake	Calculated	mg/kg-day	See equations	Daily Intake (mg/kg-day) for carcinogens (adult) =
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	$\frac{CS \times IR\text{-}SA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATc}$
				IR-SA	Ingestion Rate, soil - adult	100	mg/day	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				RBA	Relative Bioavailability Factor	Chemical-Specific	unitless	Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2021	Daily Intake (mg/kg-day) for noncarcinogens (adult) =
				FI-S	Fraction Ingested from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	$\frac{CS \times IR\text{-}SA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATnc,a}$
				EF	Exposure Frequency	52	days/year	Best professional judgement	
				EDa	Exposure Duration, adult	20	years	USEPA, 2014 (EDr (26 years) - EDc (6 years))	Daily Intake (mg/kg-day) for carcinogens (lifetime) =
				BWa	Body Weight, adult	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	[DI for carcinogens (adult) + DI for carcinogens (child)]
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc,a	Averaging Time, noncarcinogens - adult	7300	days	USEPA, 1989 (ED x 365 days/year)	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
Ingestion	Recreator (Current/Future)	Child	Ingestion of Soil						**Non-Mutagenic Constituents**
				DI	Daily Intake	Calculated	mg/kg-day	See equations	Daily Intake (mg/kg-day) for carcinogens (child) =
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	$\frac{CS \times IR\text{-}SC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATc}$
				IR-SC	Ingestion Rate, soil - child	200	mg/day	USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion)	
				RBA	Relative Bioavailability Factor	Chemical-Specific	unitless	Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2021	Daily Intake (mg/kg-day) for noncarcinogens (child) =
				FI-S	Fraction Ingested from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	$\frac{CS \times IR\text{-}SC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATnc,c}$
				EF	Exposure Frequency	52	days/year	Best professional judgement	
				EDc	Exposure Duration, child	6	years	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	Daily Intake (mg/kg-day) for carcinogens (lifetime) =
				BWc	Body Weight, child	15	kg	USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years))	[DI for carcinogens (adult) + DI for carcinogens (child)]
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc,c	Averaging Time, noncarcinogens - child	2190	days	USEPA, 1989 (ED x 365 days/year)	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
Ingestion	Recreator (Current/Future)	Lifetime	Ingestion of Soil						**Mutagenic Constituents**
				DI	Daily Intake	Calculated	mg/kg-day	See equations	Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) =
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	$\frac{CS \times RBA \times FI\text{-}S \times CF1 \times IFSMadj}{ATc}$
				RBA	Relative Bioavailability Factor	Chemical-Specific	unitless	Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2021	
				FI-S	Fraction Ingested from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	

Table A-4.1
Values Used for Daily Intake and Dermally Absorbed Dose Calculations - Incidental Ingestion and Dermal Absorption of Soil
Reasonable Maximum Exposure
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: See Below
Medium: Soil
Exposure Medium: Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Ingestion	Recreator (Current/Future)	Lifetime	Ingestion of Soil	CF1	Conversion Factor 1	0.000001	kg/mg	-	Where IFSMadj (mg/kg) =
				IFSMadj	Mutagenic Ingestion Rate - Age-adjusted	24787	mg/kg	See equations	$\frac{EF\times IR\text{-}SC}{BW_c}\times[(ED_{0-2}\times ADAF_{0-2})+(ED_{2-6}\times ADAF_{2-6})]+$
				EF	Exposure Frequency	52	days/year	Best professional judgement	$\frac{EF\times IR\text{-}SA}{BW_a}\times[(ED_{6-16}\times ADAF_{6-16})+(ED_{16-26}\times ADAF_{16-26})$
				IR-SA	Ingestion Rate, soil - adult	100	mg/day	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				IR-SC	Ingestion Rate, soil - child	200	mg/day	USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion)	
				ED0-2	Exposure Duration, 0-2 years	2	years	USEPA, 2005	
				ED2-6	Exposure Duration, 2-6 years	4	years	USEPA, 2005	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ED16-26	Exposure Duration, 16-26 years	10	years	USEPA, 2005	
				ADAF0-2	Age Depend. Adjust. Factor, 0-2 years	10	unitless	USEPA, 2005	
				ADAF2-6	Age Depend. Adjust. Factor, 2-6 years	3	unitless	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	
				ADAF16-26	Age Depend. Adjust. Factor, 16-26 years	1	unitless	USEPA, 2005	
				BWa	Body Weight, adult	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	
				BWc	Body Weight, child	15	kg	USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years))	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
Ingestion	Trespasser (Current/Future)	Adolescent	Ingestion of Soil						**Non-Mutagenic Constituents**
				DI	Daily Intake	Calculated	mg/kg-day	See equations	Daily Intake (mg/kg-day) for carcinogens (adolescent) =
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	$\frac{CS \times IR\text{-}TP \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATc}$
				RBA	Relative Bioavailability Factor	Chemical-Specific	unitless	Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2021	Daily Intake (mg/kg-day) for noncarcinogens (adolescent) =
				FI-S	Fraction Ingested from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	$\frac{CS \times IR\text{-}TP \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATnc,c}$
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
				IFSMadj	Mutagenic Ingestion Rate - Age-adjusted	513	mg/kg	See equations	**Mutagenic Constituents**
				EF	Exposure Frequency	16	days/year	Best professional judgement	Daily Intake (mg/kg-day) for mutagenic carcinogens =
				IR-TP	Ingestion Rate, soil	50	mg/day	Best professional judgement	$\frac{CS \times RBA \times FI\text{-}S \times CF1 \times IFSMadj}{ATc}$
				ED	Exposure Duration	10	years	Best professional judgement	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	
				BW	Body Weight	46.8	kg	USEPA, 2011 (6-16 years)	Where IFSMadj (mg/kg) =
				ATnc	Averaging Time, noncarcinogens	3650	days	USEPA, 1989 (ED x 365 days/year)	$\frac{EF\times IR}{BW}\times[(ED_{6-16}\times ADAF_{6-16})]$
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
Ingestion	Industrial Worker (Current/Future)	Adult	Ingestion of Soil						**Non-Mutagenic Constituents**
				DI	Daily Intake	Calculated	mg/kg-day	See equations	Daily Intake (mg/kg-day) for carcinogens (adult) =
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	$\frac{CS \times IR\text{-}S \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATc}$
				IR-S	Ingestion Rate, soil	100	mg/day	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				RBA	Relative Bioavailability Factor	Chemical-Specific	unitless	Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2021	Daily Intake (mg/kg-day) for noncarcinogens (adult) =
				FI-S	Fraction Ingested from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	$\frac{CS \times IR\text{-}S \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATnc}$
				EF	Exposure Frequency	250	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	
				ED	Exposure Duration	25	years	USEPA, 2014 (USEPA, 1991; pg 15)	

Table A-4.1
Values Used for Daily Intake and Dermally Absorbed Dose Calculations - Incidental Ingestion and Dermal Absorption of Soil
Reasonable Maximum Exposure
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: See Below
Medium: Soil
Exposure Medium: Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Ingestion	Industrial Worker (Current/Future)	Adult	Ingestion of Soil	BW	Body Weight	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc	Averaging Time, noncarcinogens	9125	days	USEPA, 1989 (ED x 365 days/year)	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
Ingestion	Construction Worker (Future)	Adult	Ingestion of Soil						**Non-Mutagenic Constituents** Daily Intake (mg/kg-day) for carcinogens (adult) = CS x IR-S x RBA x EF x FI-S x ED x CF1 / BW x ATc Daily Intake (mg/kg-day) for noncarcinogens (adult) = CS x IR-S x RBA x EF x FI-S x ED x CF1 / BW x ATnc
				DI	Daily Intake	Calculated	mg/kg-day	See equations	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				IR-S	Ingestion Rate, soil	330	mg/day	USEPA, 2002	
				RBA	Relative Bioavailability Factor	Chemical-Specific	unitless	Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2021	
				FI-S	Fraction Ingested from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	
				EF	Exposure Frequency	250	days/year	Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year))	
				ED	Exposure Duration	1	years	Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year))	
				BW	Body Weight	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc	Averaging Time, noncarcinogens	365	days	USEPA, 1989 (ED x 365 days/year)	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
Dermal Absorption	Hypothetical Resident (Future)	Adult	Dermal Absorption of Soil						**Non-Mutagenic Constituents** Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = DA-event x EV x EF x FC-S x EDa x SAa / BWa x ATc Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = DA-event x EV x EF x FC-S x EDa x SAa / BWa x ATnc,a **Where:** DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFa x ABS Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)]
				DAD	Dermally Absorbed Dose	Calculated	mg/kg-day	See equations	
				DA-event	Absorbed Dose per Event	Calculated	mg/cm²-event	USEPA, 2004	
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	
				FC-S	Fraction of Contact from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	
				EDa	Exposure Duration, adult	20	years	USEPA, 2014 (EDr (26 years) - EDc (6 years))	
				SAa	Skin Surface Area, adult	6032	cm²	USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years))	
				BWa	Body Weight, adult	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc,a	Averaging Time, noncarcinogens - adult	7300	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
				AFa	Soil-to-skin Adherence Factor, adult	0.07	mg/cm²-event	USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario)	
				ABS	Dermal Absorption Factor, soil	Chemical-Specific	unitless	USEPA, 2004; values presented in Table E-1	
Dermal Absorption	Hypothetical Resident (Future)	Child	Dermal Absorption of Soil						**Non-Mutagenic Constituents** Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = DA-event x EV x EF x FC-S x EDc x SAc / BWc x ATc
				DAD	Dermally Absorbed Dose	Calculated	mg/kg-day	See equations	
				DA-event	Absorbed Dose per Event	Calculated	mg/cm²-event	USEPA, 2004	
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	

Table A-4.1
Values Used for Daily Intake and Dermally Absorbed Dose Calculations - Incidental Ingestion and Dermal Absorption of Soil
Reasonable Maximum Exposure
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Soil**

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Dermal Absorption	Hypothetical Resident (Future)	Child	Dermal Absorption of Soil	FC-S	Fraction of Contact from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}S \times EDc \times SAc}{BWc \times ATnc,c}$ **Where:** DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFc x ABS Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)]
				EDc	Exposure Duration, child	6	years	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				SAc	Skin Surface Area, child	2373	cm²	USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere))	
				BWc	Body Weight, child	15	kg	USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years))	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc,c	Averaging Time, noncarcinogens - child	2190	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
				AFc	Soil-to-skin Adherence Factor, child	0.2	mg/cm²-event	USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario)	
				ABS	Dermal Absorption Factor, soil	Chemical-Specific	unitless	USEPA, 2004; values presented in Table E-1	
Dermal Absorption	Hypothetical Resident (Future)	Lifetime	Dermal Absorption of Soil						**Mutagenic Constituents**
				DAD	Dermally Absorbed Dose	Calculated	mg/kg-day	See equations	Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CS \times ABS \times FC\text{-}S \times CF1 \times DFSMadj}{ATc}$ Where DFSMadj (mg/kg) = $\frac{EF \times AF_c \times SA_c}{BW_c} \times [(ED_{0-2} \times ADAF_{0-2}) + (ED_{2-6} \times ADAF_{2-6})] +$ $\frac{EF \times AF_a \times SA_a}{BW_a} \times [(ED_{6-16} \times ADAF_{6-16}) + (ED_{16-26} \times ADAF_{16-26})]$
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				ABS	Dermal Absorption Factor, soil	Chemical-Specific	unitless	USEPA, 2004; values presented in Table E-1	
				FC-S	Fraction of Contact from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
				DFSMadj	Mutagenic dermal contact factor- age-adjusted	428260	mg/kg	See equations	
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	
				AFc	Soil-to-skin Adherence Factor, child	0.2	mg/cm²-event	USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario)	
				SAc	Skin Surface Area, child	2373	cm²	USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere))	
				ED0-2	Exposure Duration, 0-2 years	2	years	USEPA, 2005	
				ED2-6	Exposure Duration, 2-6 years	4	years	USEPA, 2005	
				ADAF0-2	Age Depend. Adjust. Factor, 0-2 years	10	unitless	USEPA, 2005	
				ADAF2-6	Age Depend. Adjust. Factor, 2-6 years	3	unitless	USEPA, 2005	
				BWc	Body Weight, child	15	kg	USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years))	
				AFa	Soil-to-skin Adherence Factor, adult	0.07	mg/cm²-event	USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario)	
				SAa	Skin Surface Area, adult	6032	cm²	USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years))	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ED16-26	Exposure Duration, 16-26 years	10	years	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	

Table A-4.1
Values Used for Daily Intake and Dermally Absorbed Dose Calculations - Incidental Ingestion and Dermal Absorption of Soil
Reasonable Maximum Exposure
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Soil**

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Dermal Absorption	Hypothetical Resident (Future)	Lifetime	Dermal Absorption of Soil	ADAF16-26	Age Depend. Adjust. Factor, 16-26 years	1	unitless	USEPA, 2005	
				BWa	Body Weight, adult	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
Dermal Absorption	Recreator (Current/Future)	Adult	Dermal Absorption of Soil						**Non-Mutagenic Constituents**
				DAD	Dermally Absorbed Dose	Calculated	mg/kg-day	See equations	Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) =
				DA-event	Absorbed Dose per Event	Calculated	mg/cm²-event	USEPA, 2004	$\frac{\text{DA-event x EV x EF x FC-S x EDa x SAa}}{\text{BWa x ATc}}$
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	52	days/year	Best professional judgement	Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) =
				FC-S	Fraction of Contact from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	$\frac{\text{DA-event x EV x EF x FC-S x EDa x SAa}}{\text{BWa x ATnc,a}}$
				EDa	Exposure Duration, adult	20	years	USEPA, 2014 (EDr (26 years) - EDc (6 years))	
				SAa	Skin Surface Area, adult	6032	cm²	USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years))	**Where:**
				BWa	Body Weight, adult	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFa x ABS
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) =
				ATnc,a	Averaging Time, noncarcinogens - adult	7300	days	USEPA, 1989 (ED x 365 days/year)	[DAD for carcinogens (adult) + DAD for carcinogens (child)]
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
				AFa	Soil-to-skin Adherence Factor, adult	0.07	mg/cm²-event	USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario)	
				ABS	Dermal Absorption Factor, soil	Chemical-Specific	unitless	USEPA, 2004; values presented in Table E-1	
Dermal Absorption	Recreator (Current/Future)	Child	Dermal Absorption of Soil						**Non-Mutagenic Constituents**
				DAD	Dermally Absorbed Dose	Calculated	mg/kg-day	See equations	Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) =
				DA-event	Absorbed Dose per Event	Calculated	mg/cm²-event	USEPA, 2004	$\frac{\text{DA-event x EV x EF x FC-S x EDc x SAc}}{\text{BWc x ATc}}$
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	52	days/year	Best professional judgement	Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) =
				FC-S	Fraction of Contact from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	$\frac{\text{DA-event x EV x EF x FC-S x EDc x SAc}}{\text{BWc x ATnc,c}}$
				EDc	Exposure Duration, child	6	years	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				SAc	Skin Surface Area, child	2373	cm²	USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere))	**Where:**
				BWc	Body Weight, child	15	kg	USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years))	DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFc x ABS
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) =
				ATnc,c	Averaging Time, noncarcinogens - child	2190	days	USEPA, 1989 (ED x 365 days/year)	[DAD for carcinogens (adult) + DAD for carcinogens (child)]
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	

Table A-4.1
Values Used for Daily Intake and Dermally Absorbed Dose Calculations - Incidental Ingestion and Dermal Absorption of Soil
Reasonable Maximum Exposure
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Soil**

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Dermal Absorption	Recreator (Current/Future)	Child	Dermal Absorption of Soil	CF1	Conversion Factor 1	0.000001	kg/mg	-	
				AFc	Soil-to-skin Adherence Factor, child	0.2	mg/cm²-event	USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario)	
				ABS	Dermal Absorption Factor, soil	Chemical-Specific	unitless	USEPA, 2004; values presented in Table E-1	
Dermal Absorption	Recreator (Current/Future)	Lifetime	Dermal Absorption of Soil						**Mutagenic Constituents**
				DAD	Dermally Absorbed Dose	Calculated	mg/kg-day	See equations	Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CS \times ABS \times FC\text{-}S \times CF1 \times DFSMadj}{ATc}$
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				ABS	Dermal Absorption Factor, soil	Chemical-Specific	unitless	USEPA, 2004; values presented in Table E-1	
				FC-S	Fraction of Contact from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	Where DFSMadj (mg/kg) =
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
				DFSMadj	Mutagenic dermal contact factor- age-adjusted	63627	mg/kg	See equations	$\frac{EF\times AF_c \times SA_c}{BW_c}\times[(ED_{0-2}\times ADAF_{0-2})+(ED_{2-6}\times ADAF_{2-6})]+$
				EF	Exposure Frequency	52	days/year	Best professional judgement	$\frac{EF\times AF_a \times SA_a}{BW_a}\times[(ED_{6-16}\times ADAF_{6-16})+(ED_{16-26}\times ADAF_{16-26})]$
				AFc	Soil-to-skin Adherence Factor, child	0.2	mg/cm²-event	USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario)	
				SAc	Skin Surface Area, child	2373	cm²	USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere))	
				ED0-2	Exposure Duration, 0-2 years	2	years	USEPA, 2005	
				ED2-6	Exposure Duration, 2-6 years	4	years	USEPA, 2005	
				ADAF0-2	Age Depend. Adjust. Factor, 0-2 years	10	unitless	USEPA, 2005	
				ADAF2-6	Age Depend. Adjust. Factor, 2-6 years	3	unitless	USEPA, 2005	
				BWc	Body Weight, child	15	kg	USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years))	
				AFa	Soil-to-skin Adherence Factor, adult	0.07	mg/cm²-event	USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario)	
				SAa	Skin Surface Area, adult	6032	cm²	USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years))	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ED16-26	Exposure Duration, 16-26 years	10	years	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	
				ADAF16-26	Age Depend. Adjust. Factor, 16-26 years	1	unitless	USEPA, 2005	
				BWa	Body Weight, adult	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
Dermal Absorption	Trespasser (Current/Future)	Adolescent	Dermal Absorption of Soil						**Non-Mutagenic Constituents**
				DAD	Dermally Absorbed Dose	Calculated	mg/kg-day	See equations	Dermally Absorbed Dose (mg/kg-day) for carcinogens = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}S \times ED \times SA}{BW \times ATc}$
				DA-event	Absorbed Dose per Event	Calculated	mg/cm²-event	USEPA, 2004	
				EV	Event Frequency	1	events/day	USEPA, 2004	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				ABS	Dermal Absorption Factor, soil	Chemical-Specific	unitless	USEPA, 2004; values presented in Table E-1	

Table A-4.1
Values Used for Daily Intake and Dermally Absorbed Dose Calculations - Incidental Ingestion and Dermal Absorption of Soil
Reasonable Maximum Exposure
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe: See Below
Medium: Soil
Exposure Medium: Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Dermal Absorption	Trespasser (Current/Future)	Adolescent	Dermal Absorption of Soil	FC-S	Fraction of Contact from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	Dermally Absorbed Dose (mg/kg-day) for noncarcinogens = $\frac{\text{DA-event x EV x EF x FC-S x ED x SA}}{\text{BW x ATnc,c}}$
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
				DFSMadj	Mutagenic dermal contact factor- age-adjusted	3511	mg/kg	See equations	
				EF	Exposure Frequency	16	days/year	Best professional judgement	DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFa x ABS
				AFa	Soil-to-skin Adherence Factor, adult	0.07	mg/cm²-event	USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario)	**Mutagenic Constituents** Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens = $\frac{\text{DA-event x ABS x FC-S x CF1 x DFSMadj}}{\text{ATc}}$
				SA	Skin Surface Area	4890	cm²	USEPA, 2011	
				BW	Body Weight	46.8	kg	USEPA, 2011 (6-16 years)	
				ED	Exposure Duration	10	years	Best professional judgement	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	Where DFSMadj (mg/kg) = $\frac{\text{EF} \times \text{AF}_a \times SA}{BW} \times \left[(\text{ED}_{6-16} \times \text{ADAF}_{6-16})\right]$
				ATnc	Averaging Time, noncarcinogens	3650	days	USEPA, 1989 (ED x 365 days/year)	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
Dermal Absorption	Industrial Worker (Current/Future)	Adult	Dermal Absorption of Soil						**Non-Mutagenic Constituents**
				DAD	Dermally Absorbed Dose	Calculated	mg/kg-day	See equations	Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = $\frac{\text{DA-event x EV x EF x FC-S x ED x SA}}{\text{BW x ATc}}$
				DA-event	Absorbed Dose per Event	Calculated	mg/cm²-event	USEPA, 2004	
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	250	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	
				FC-S	Fraction of Contact from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = $\frac{\text{DA-event x EV x EF x FC-S x ED x SA}}{\text{BW x ATnc}}$
				ED	Exposure Duration	25	years	USEPA, 2014 (USEPA, 1991; pg 15)	
				SA	Skin Surface Area	3527	cm²	USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years))	**Where:**
				BW	Body Weight	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AF x ABS
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc	Averaging Time, noncarcinogens	9125	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
				AF	Soil-to-skin Adherence Factor	0.12	mg/cm²-event	USEPA, 2014 (USEPA, 2011; Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult commercial/industrial activities)	
				ABS	Dermal Absorption Factor, soil	Chemical-Specific	unitless	USEPA, 2004; values presented in Table E-1	
Dermal Absorption	Construction Worker (Future)	Adult	Dermal Absorption of Soil						**Non-Mutagenic Constituents**
				DAD	Dermally Absorbed Dose	Calculated	mg/kg-day	See equations	Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = $\frac{\text{DA-event x EV x EF x FC-S x ED x SA}}{\text{BW x ATc}}$
				DA-event	Absorbed Dose per Event	Calculated	mg/cm²-event	USEPA, 2004	
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	250	days/year	Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year))	Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = $\frac{\text{DA-event x EV x EF x FC-S x ED x SA}}{\text{BW x ATnc}}$
				FC-S	Fraction of Contact from Source, soil	1	unitless	USEPA, 1989 (Default of 1 (100%) is assumed)	
				ED	Exposure Duration	1	years	Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year))	

Table A-4.1
Values Used for Daily Intake and Dermally Absorbed Dose Calculations - Incidental Ingestion and Dermal Absorption of Soil
Reasonable Maximum Exposure
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Soil**

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Dermal Absorption	Construction Worker (Future)	Adult	Dermal Absorption of Soil	SA	Skin Surface Area	3527	cm^2	USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)); assume protective work boots are worn)	**Where:** DA-event (Absorbed Dose per Event [mg/cm^2-event]) = CS x CF1 x AF x ABS
				BW	Body Weight	80	kg	USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78)	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc	Averaging Time, noncarcinogens	365	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				CF1	Conversion Factor 1	0.000001	kg/mg	-	
				AF	Soil-to-skin Adherence Factor	0.3	mg/cm^2-event	USEPA, 2004 (Exhibit 3-3; 95th percentile value for construction workers)	
				ABS	Dermal Absorption Factor, soil	Chemical-Specific	unitless	USEPA, 2004; values presented in Table E-1	

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Table A-4.2
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Shaffer Equipment/Arbuckle Creek Area Superfund Site
Fayette County, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Air**

Exposure Route	Receptor Population (1)	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Inhalation	Hypothetical Resident (Future)	Adult	Inhalation of Windblown Dust in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for carcinogens (adult) =
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	$\frac{CA \times EF \times ET \times EDa}{CF1 \times ATc}$
				ET	Exposure Time	24	hours/day	USEPA, 2014	
				EDa	Exposure Duration, adult	20	years	USEPA, 2014 (EDr (26 years) - EDc (6 years))	
				CF1	Conversion Factor 1	24	hours/day	-	Exposure concentration (µg/m³) for non-carcinogens (adult) =
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$\frac{CA \times EF \times ET \times EDa}{CF1 \times ATnc,a}$
				ATnc,a	Averaging Time, noncarcinogens - adult	7300	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Where:
				PEF	Particulate Emission Factor	1.36E+09	m³/kg	Default value for West Virginia	CA (µg/m³) = (CS/PEF) x CF2
				CF2	Conversion Factor 2	1000	µg/mg	-	Exposure concentration (µg/m³) for carcinogens (lifetime) =
									[EC for carcinogens (adult) + EC for carcinogens (child)]
Inhalation	Hypothetical Resident (Future)	Child	Inhalation of Windblown Dust in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for carcinogens (child) =
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	$\frac{CA \times EF \times ET \times EDc}{CF1 \times ATc}$
				ET	Exposure Time	24	hours/day	USEPA, 2014	
				EDc	Exposure Duration, child	6	years	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				CF1	Conversion Factor 1	24	hours/day	-	Exposure concentration (µg/m³) for non-carcinogens (child) =
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$\frac{CA \times EF \times ET \times EDc}{CF1 \times ATnc,c}$
				ATnc,c	Averaging Time, noncarcinogens - child	2190	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Where:
				PEF	Particulate Emission Factor	1360000000	m³/kg	Default value for West Virginia	CA (µg/m³) = (CS/PEF) x CF2
				CF2	Conversion Factor 2	1000	µg/mg	-	Exposure concentration (µg/m³) for carcinogens (lifetime) =
									[EC for carcinogens (adult) + EC for carcinogens (child)]
Inhalation	Hypothetical Resident (Future)	Lifetime	Inhalation of Windblown Dust in Outdoor Air						**Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) =
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	$\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$
				ET	Exposure Time	24	hours/day	USEPA, 2014	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				CF1	Conversion Factor 1	24	hours/day	-	
				ED0-2	Exposure Duration, 0-2 years	2	years	USEPA, 2005	Where:
				ADAF0-2	Age Depend. Adjust. Factor, 0-2 years	10	unitless	USEPA, 2005	CA (µg/m³) = (CS/PEF) x CF2
				ED2-6	Exposure Duration, 2-6 years	4	years	USEPA, 2005	
				ADAF2-6	Age Depend. Adjust. Factor, 2-6 years	3	unitless	USEPA, 2005	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	
				ED16-26	Exposure Duration, 16-26 years	10	years	USEPA, 2005	
				ADAF16-26	Age Depend. Adjust. Factor, 16-26 years	1	unitless	USEPA, 2005	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				PEF	Particulate Emission Factor	1.36E+09	m³/kg	Default value for West Virginia	
				CF2	Conversion Factor 2	1000	µg/mg	-	

Table A-4.2
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Shaffer Equipment/Arbuckle Creek Area Superfund Site
Fayette County, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Air**

Exposure Route	Receptor Population (1)	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Inhalation	Recreator (Current/Future)	Adult	Inhalation of Windblown Dust in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for carcinogens (adult) = $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATc}$
				EF	Exposure Frequency	52	days/year	Best professional judgement	
				ET	Exposure Time	3.6	hours/day	USEPA, 2011 (Table 16-26; mean value (217.3 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US)	Exposure concentration (µg/m³) for noncarcinogens (adult) = $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATnc,a}$
				EDa	Exposure Duration, adult	20	years	USEPA, 2014 (EDr (26 years) - EDc (6 years))	
				CF1	Conversion Factor 1	24	hours/day	-	Where:
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$CA\ (\mu g/m^3) = (CS/PEF) \times CF2$
				ATnc,a	Averaging Time, noncarcinogens - adult	7300	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Exposure concentration (µg/m³) for carcinogens (lifetime) = [EC for carcinogens (adult) + EC for carcinogens (child)]
				PEF	Particulate Emission Factor	1.36E+09	m³/kg	Default value for West Virginia	
				CF2	Conversion Factor 2	1000	µg/mg	-	
Inhalation	Recreator (Current/Future)	Child	Inhalation of Windblown Dust in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for carcinogens (child) = $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATc}$
				EF	Exposure Frequency	52	days/year	Best professional judgement	
				ET	Exposure Time	3.6	hours/day	USEPA, 2011 (Table 16-26; mean value (217.3 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US)	Exposure concentration (µg/m³) for noncarcinogens (child) = $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATnc,c}$
				EDc	Exposure Duration, child	6	years	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				CF1	Conversion Factor 1	24	hours/day	-	Where:
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$CA\ (\mu g/m^3) = (CS/PEF) \times CF2$
				ATnc,c	Averaging Time, noncarcinogens - child	2190	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Exposure concentration (µg/m³) for carcinogens (lifetime) = [EC for carcinogens (adult) + EC for carcinogens (child)]
				PEF	Particulate Emission Factor	1.36E+09	m³/kg	Default value for West Virginia	
				CF2	Conversion Factor 2	1000	µg/mg	-	
Inhalation	Recreator (Current/Future)	Lifetime	Inhalation of Windblown Dust in Outdoor Air						**Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) = $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6}}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$
				EF	Exposure Frequency	52	days/year	Best professional judgement	
				ET	Exposure Time	3.6	hours/day	USEPA, 2011 (Table 16-26; mean value (217.3 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US)	Where:
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$CA\ (\mu g/m^3) = (CS/PEF) \times CF2$
				CF1	Conversion Factor 1	24	hours/day	-	
				ED0-2	Exposure Duration, 0-2 years	2	years	USEPA, 2005	
				ADAF0-2	Age Depend. Adjust. Factor, 0-2 years	10	unitless	USEPA, 2005	
				ED2-6	Exposure Duration, 2-6 years	4	years	USEPA, 2005	
				ADAF2-6	Age Depend. Adjust. Factor, 2-6 years	3	unitless	USEPA, 2005	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	

Table A-4.2
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Shaffer Equipment/Arbuckle Creek Area Superfund Site
Fayette County, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Air**

Exposure Route	Receptor Population (1)	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Inhalation	Recreator (Current/Future)	Lifetime	Inhalation of Windblown Dust in Outdoor Air	ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	
				ED16-26	Exposure Duration, 16-26 years	10	years	USEPA, 2005	
				ADAF16-26	Age Depend. Adjust. Factor, 16-26 years	1	unitless	USEPA, 2005	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				PEF	Particulate Emission Factor	1.36E+09	m³/kg	Default value for West Virginia	
				CF2	Conversion Factor 2	1000	µg/mg	-	
Inhalation	Trespasser (Current/Future)	Adolescent	Inhalation of Windblown Dust in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for carcinogens (adolescent) =
				EF	Exposure Frequency	16	days/year	Best professional judgement	$\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$
				ET	Exposure Time	3.6	hours/day	USEPA, 2011 (Table 16-26; mean value (217.3 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US)	Exposure concentration (µg/m³) for noncarcinogens (adolescent) =
				ATnc	Averaging Time, noncarcinogens	3650	days	USEPA, 1989 (ED x 365 days/year)	$\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				CF1	Conversion Factor 1	24	hours/day	-	
				ED	Exposure Duration	10	years	Best professional judgement	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	**Mutagenic Constituents**
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Exposure concentration (µg/m³) for mutagenic carcinogens (adolescent) =
				PEF	Particulate Emission Factor	1.36E+09	m³/kg	Default value for West Virginia	$\frac{CA \times EF \times ET}{AT_c \times CF1} \times [(ED_{6-16} \times ADAF_{6-16})]$
				CF2	Conversion Factor 2	1000	µg/mg	-	Where:
									CA (µg/m³) = (CS/PEF) x CF2
Inhalation	Industrial Worker (Current/Future)	Adult	Inhalation of Windblown Dust in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for carcinogens (adult) =
				EF	Exposure Frequency	250	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	$\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$
				ET	Exposure Time	8	hours/day	USEPA, 2014 (8-hour work day)	
				ED	Exposure Duration	25	years	USEPA, 2014 (USEPA, 1991; pg 15)	
				CF1	Conversion Factor 1	24	hours/day	-	Exposure concentration (µg/m³) for noncarcinogens (adult) =
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$
				ATnc	Averaging Time, noncarcinogens	9125	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Where:
				PEF	Particulate Emission Factor	1.36E+09	m³/kg	Default value for West Virginia	CA (µg/m³) = (CS/PEF) x CF2
				CF2	Conversion Factor 2	1000	µg/mg	-	
Inhalation	Construction Worker (Future)	Adult	Inhalation of Windblown Dust in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for carcinogens (adult) =
				EF	Exposure Frequency	250	days/year	Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year))	$\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$
				ET	Exposure Time	8	hours/day	USEPA, 2014 (8-hour work day)	
				ED	Exposure Duration	1	years	Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year))	Exposure concentration (µg/m³) for noncarcinogens (adult) =
				CF1	Conversion Factor 1	24	hours/day	-	$\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$

Table A-4.2
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Shaffer Equipment/Arbuckle Creek Area Superfund Site
Fayette County, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Air**

Exposure Route	Receptor Population (1)	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Inhalation	Construction Worker (Future)	Adult	Inhalation of Windblown Dust in Outdoor Air	ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	Where:
				ATnc	Averaging Time, noncarcinogens	365	days	USEPA, 1989 (ED x 365 days/year)	$CA\ (\mu g/m^3) = (CS/PEF) \times CF2$
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				PEF	Particulate Emission Factor	Site Specific	m^3/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	
				CF2	Conversion Factor 2	1000	µg/mg	-	
Inhalation	Hypothetical Resident (Future)	Adult	Inhalation of Vapors in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	$\mu g/m^3$	-	Exposure concentration ($\mu g/m^3$) for carcinogens (adult) =
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	$\frac{CA \times EF \times ET \times EDa}{CF1 \times ATc}$
				ET	Exposure Time	24	hours/day	USEPA, 2014	
				EDa	Exposure Duration, adult	20	years	USEPA, 2014 (EDr (26 years) - EDc (6 years))	
				CF1	Conversion Factor 1	24	hours/day	-	Exposure concentration ($\mu g/m^3$) for non-carcinogens (adult) =
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$\frac{CA \times EF \times ET \times EDa}{CF1 \times ATnc,a}$
				ATnc,a	Averaging Time, noncarcinogens - adult	7300	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Where:
				VF	Volatilization Factor	Calculated	m^3/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	$CA\ (\mu g/m^3) = (CS/VF) \times CF2$
				CF2	Conversion Factor 2	1000	µg/mg	-	Exposure concentration ($\mu g/m^3$) for carcinogens (lifetime) =
									[EC for carcinogens (adult) + EC for carcinogens (child)]
Inhalation	Hypothetical Resident (Future)	Child	Inhalation of Vapors in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	$\mu g/m^3$	-	Exposure concentration ($\mu g/m^3$) for carcinogens (child) =
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	$\frac{CA \times EF \times ET \times EDc}{CF1 \times ATc}$
				ET	Exposure Time	24	hours/day	USEPA, 2014	
				EDc	Exposure Duration, child	6	years	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				CF1	Conversion Factor 1	24	hours/day	-	Exposure concentration ($\mu g/m^3$) for non-carcinogens (child) =
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$\frac{CA \times EF \times ET \times EDc}{CF1 \times ATnc,c}$
				ATnc,c	Averaging Time, noncarcinogens - child	2190	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Where:
				VF	Volatilization Factor	Calculated	m^3/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	$CA\ (\mu g/m^3) = (CS/VF) \times CF2$
				CF2	Conversion Factor 2	1000	µg/mg	-	Exposure concentration ($\mu g/m^3$) for carcinogens (lifetime) =
									[EC for carcinogens (adult) + EC for carcinogens (child)]
Inhalation	Hypothetical Resident (Future)	Lifetime	Inhalation of Vapors in Outdoor Air						**Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	$\mu g/m^3$	-	Exposure concentration ($\mu g/m^3$) for mutagenic carcinogens (lifetime) =
				EF	Exposure Frequency	350	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	$\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$
				ET	Exposure Time	24	hours/day	USEPA, 2014	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				CF1	Conversion Factor 1	24	hours/day	-	
				ED0-2	Exposure Duration, 0-2 years	2	years	USEPA, 2005	Where:
				ADAF0-2	Age Depend. Adjust. Factor, 0-2 years	10	unitless	USEPA, 2005	$CA\ (\mu g/m^3) = (CS/VF) \times CF2$
				ED2-6	Exposure Duration, 2-6 years	4	years	USEPA, 2005	
				ADAF2-6	Age Depend. Adjust. Factor, 2-6 years	3	unitless	USEPA, 2005	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	
				ED16-26	Exposure Duration, 16-26 years	10	years	USEPA, 2005	

Table A-4.2
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Shaffer Equipment/Arbuckle Creek Area Superfund Site
Fayette County, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Air**

Exposure Route	Receptor Population (1)	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Inhalation	Hypothetical Resident (Future)	Lifetime	Inhalation of Vapors in Outdoor Air	ADAF16-26	Age Depend. Adjust. Factor, 16-26 years	1	unitless	USEPA, 2005	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				VF	Volatilization Factor	Calculated	m^3/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	
				CF2	Conversion Factor 2	1000	µg/mg	-	
Inhalation	Recreator (Current/Future)	Adult	Inhalation of Vapors in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	$µg/m^3$	-	Exposure concentration ($µg/m^3$) for carcinogens (adult) = $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATc}$
				EF	Exposure Frequency	52	days/year	Best professional judgement	
				ET	Exposure Time	3.6	hours/day	USEPA, 2011 (Table 16-26; mean value (217.3 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US)	Exposure concentration ($µg/m^3$) for noncarcinogens (adult) = $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATnc,a}$
				EDa	Exposure Duration, adult	20	years	USEPA, 2014 (EDr (26 years) - EDc (6 years))	
				CF1	Conversion Factor 1	24	hours/day	-	Where:
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$CA\ (µg/m^3) = (CS/VF) \times CF2$
				ATnc,a	Averaging Time, noncarcinogens - adult	7300	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Exposure concentration ($µg/m^3$) for carcinogens (lifetime) = [EC for carcinogens (adult) + EC for carcinogens (child)]
				VF	Volatilization Factor	Calculated	m^3/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	
				CF2	Conversion Factor 2	1000	µg/mg	-	
Inhalation	Recreator (Current/Future)	Child	Inhalation of Vapors in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	$µg/m^3$	-	Exposure concentration ($µg/m^3$) for carcinogens (child) = $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATc}$
				EF	Exposure Frequency	52	days/year	Best professional judgement	
				ET	Exposure Time	3.6	hours/day	USEPA, 2011 (Table 16-26; mean value (217.3 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US)	Exposure concentration ($µg/m^3$) for noncarcinogens (child) = $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATnc,c}$
				EDc	Exposure Duration, child	6	years	USEPA, 2014 (USEPA, 1991; pp 6 and 15)	
				CF1	Conversion Factor 1	24	hours/day	-	Where:
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$CA\ (µg/m^3) = (CS/VF) \times CF2$
				ATnc,c	Averaging Time, noncarcinogens - child	2190	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Exposure concentration ($µg/m^3$) for carcinogens (lifetime) = [EC for carcinogens (adult) + EC for carcinogens (child)]
				VF	Volatilization Factor	Calculated	m^3/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	
				CF2	Conversion Factor 2	1000	µg/mg	-	
Inhalation	Recreator (Current/Future)	Lifetime	Inhalation of Vapors in Outdoor Air						**Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	$µg/m^3$	-	Exposure concentration ($µg/m^3$) for mutagenic carcinogens (lifetime) = $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$
				EF	Exposure Frequency	52	days/year	Best professional judgement	
				ET	Exposure Time	3.6	hours/day	USEPA, 2011 (Table 16-26; mean value (217.3 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US)	Where:
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	$CA\ (µg/m^3) = (CS/VF) \times CF2$
				CF1	Conversion Factor 1	24	hours/day	-	

Table A-4.2
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Shaffer Equipment/Arbuckle Creek Area Superfund Site
Fayette County, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Air**

Exposure Route	Receptor Population (1)	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Inhalation	Recreator (Current/Future)	Lifetime	Inhalation of Vapors in Outdoor Air	ED0-2	Exposure Duration, 0-2 years	2	years	USEPA, 2005	
				ADAF0-2	Age Depend. Adjust. Factor, 0-2 years	10	unitless	USEPA, 2005	
				ED2-6	Exposure Duration, 2-6 years	4	years	USEPA, 2005	
				ADAF2-6	Age Depend. Adjust. Factor, 2-6 years	3	unitless	USEPA, 2005	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	
				ED16-26	Exposure Duration, 16-26 years	10	years	USEPA, 2005	
				ADAF16-26	Age Depend. Adjust. Factor, 16-26 years	1	unitless	USEPA, 2005	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				VF	Volatilization Factor	Calculated	m^3/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	
				CF2	Conversion Factor 2	1000	µg/mg	-	
Inhalation	Trespasser (Current/Future)	Adolescent	Inhalation of Vapors in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	$µg/m^3$	-	Exposure concentration ($µg/m^3$) for carcinogens (adolescent) = $\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$
				EF	Exposure Frequency	16	days/year	Best professional judgement	
				ET	Exposure Time	3.6	hours/day	USEPA, 2011 (Table 16-26; mean value (217.3 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US)	Exposure concentration ($µg/m^3$) for noncarcinogens (adolescent) = $\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$
				ATnc	Averaging Time, noncarcinogens	3650	days	USEPA, 1989 (ED x 365 days/year)	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				CF1	Conversion Factor 1	24	hours/day	-	
				ED	Exposure Duration	10	years	Best professional judgement	
				ED6-16	Exposure Duration, 6-16 years	10	years	USEPA, 2005	
				ADAF6-16	Age Depend. Adjust. Factor, 6-16 years	3	unitless	USEPA, 2005	**Mutagenic Constituents**
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Exposure concentration ($µg/m^3$) for mutagenic carcinogens (adolescent) = $\frac{CA \times EF \times ET}{AT_c \times CF1} \times [(ED_{6-16} \times ADAF_{6-16})]$
				VF	Volatilization Factor	Calculated	m^3/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	
				CF2	Conversion Factor 2	1000	µg/mg	-	Where:
									CA ($µg/m^3$) = (CS/VF) x CF2
Inhalation	Industrial Worker (Current/Future)	Adult	Inhalation of Vapors in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	$µg/m^3$	-	Exposure concentration ($µg/m^3$) for carcinogens (adult) = $\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$
				EF	Exposure Frequency	250	days/year	USEPA, 2014 (USEPA, 1991; pg 15)	
				ET	Exposure Time	8	hours/day	USEPA, 2014 (8-hour work day)	
				ED	Exposure Duration	25	years	USEPA, 2014 (USEPA, 1991; pg 15)	
				CF1	Conversion Factor 1	24	hours/day	-	Exposure concentration ($µg/m^3$) for noncarcinogens (adult) = $\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	
				ATnc	Averaging Time, noncarcinogens	9125	days	USEPA, 1989 (ED x 365 days/year)	
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	Where:
				VF	Volatilization Factor	Calculated	m^3/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	CA ($µg/m^3$) = (CS/VF) x CF2
				CF2	Conversion Factor 2	1000	µg/mg	-	

Table A-4.2
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Shaffer Equipment/Arbuckle Creek Area Superfund Site
Fayette County, Minden, West Virginia

Scenario Timeframe:	**See Below**
Medium:	**Soil**
Exposure Medium:	**Air**

Exposure Route	Receptor Population (1)	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake and Dermally Absorbed Dose Equations/ Model Name
Inhalation	Construction Worker (Future)	Adult	Inhalation of Vapors in Outdoor Air						**Non-Mutagenic Constituents**
				CA	Exposure Point Concentration, air	Modeled	µg/m³	-	Exposure concentration (µg/m³) for carcinogens (adult) = $\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$
				EF	Exposure Frequency	250	days/year	Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year))	
				ET	Exposure Time	8	hours/day	USEPA, 2014 (8-hour work day)	
				ED	Exposure Duration	1	years	Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year))	Exposure concentration (µg/m³) for noncarcinogens (adult) = $\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$
				CF1	Conversion Factor 1	24	hours/day	-	
				ATc	Averaging Time, carcinogens	25550	days	USEPA, 1989 (ED (70 years) x 365 days/year)	Where:
				ATnc	Averaging Time, noncarcinogens	365	days	USEPA, 1989 (ED x 365 days/year)	CA (µg/m³) = (CS/VF) x CF2
				CS	Exposure Point Concentration, soil	Site-Specific	mg/kg	Presented in Tables A-3.1 through A-3.3	
				VF	Volatilization Factor	Calculated	m³/kg	USEPA, 2002 (Equations presented with RAGS Support Tables, Appendix F)	
				CF2	Conversion Factor 2	1000	µg/mg	-	

References:

U.S. Environmental Protection Agency (USEPA), 1989. Risk Assessment Guidance for Superfund. Human Health Evaluation Manual. Part A. Interim Final. 9285.701A.

U.S. Environmental Protection Agency (USEPA), 1991. Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors. Office of Emergency and Remedial Response, Washington, DC. March.

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U.S. Environmental Protection Agency (USEPA), 2005. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. Risk Assessment Forum, EPA, Washington, DC. 20460, EPA/630/R-03/003F. March.

U.S. Environmental Protection Agency (USEPA), 2011. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September 2011.

U.S. Environmental Protection Agency (USEPA), 2014. Human Health Evaluation Manual. Supplemental Guidance: Update of Standard Default Exposure Factors. Office of Superfund Remediation and Technology Innovation. OSWER Directive 9200.1-120. February 6. Amended September 2015.

Table A-5.1
Non-Cancer Toxicity Data - Oral/Dermal
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Constituent of Interest	Chronic/ Subchronic [3]	Oral RfD		Oral Absorption Effiency for Dermal [1]	Absorbed RfD for Dermal [2]		Primary Target Organ/System(s)	Combined Uncertainty/ Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Semi-volatile Organic Compounds (SVOCs)										
1,2,4,5-Tetrachlorobenzene	Chronic	0.0003	mg/kg-day	1	0.0003	mg/kg-day	UR	1000	IRIS	4/12/2022
1,2,4,5-Tetrachlorobenzene	Subchronic	0.00003	mg/kg-day	1	0.00003	mg/kg-day	EN	300	PPRTV Current	4/12/2022
Benzo(a)anthracene	Chronic	--	--	--	--	--	--	--	--	4/12/2022
Benzo(a)anthracene	Subchronic	--	--	--	--	--	--	--	--	4/12/2022
Benzo(a)pyrene	Chronic	0.0003	mg/kg-day	1	0.0003	mg/kg-day	DV	300	IRIS	4/12/2022
Benzo(a)pyrene	Subchronic	0.0003	mg/kg-day	1	0.0003	mg/kg-day	DV	300	IRIS	4/12/2022
Benzo(b)fluoranthene	Chronic	--	--	--	--	--	--	--	--	4/12/2022
Benzo(b)fluoranthene	Subchronic	--	--	--	--	--	--	--	--	4/12/2022
Dibenz(a,h)anthracene	Chronic	--	--	--	--	--	--	--	--	4/12/2022
Dibenz(a,h)anthracene	Subchronic	--	--	--	--	--	--	--	--	4/12/2022
Indeno(1,2,3-cd)pyrene	Chronic	--	--	--	--	--	--	--	--	4/12/2022
Indeno(1,2,3-cd)pyrene	Subchronic	--	--	--	--	--	--	--	--	4/12/2022
Pesticides										
Dieldrin	Chronic	0.00005	mg/kg-day	1	0.00005	mg/kg-day	HP	100	IRIS	4/12/2022
Dieldrin	Subchronic	0.00005	mg/kg-day	1	0.00005	mg/kg-day	HP	100	HEAST	7/31/1997
Polychlorinated Biphenyls (PCBs)										
Aroclor 1254	Chronic	0.00002	mg/kg-day	1	0.00002	mg/kg-day	DM; IM; OC	300	IRIS	4/12/2022
Aroclor 1254	Subchronic	0.00003	mg/kg-day	1	0.00003	mg/kg-day	NV	300	ATSDR	2/1/2022
Aroclor 1260	Chronic	--	--	--	--	--	--	--	--	4/12/2022
Aroclor 1260	Subchronic	--	--	--	--	--	--	--	--	4/12/2022
Polychlorinated Biphenyls (PCBs) - Congeners [4]										
PCBC TEQ MAMMAL HALFND	Chronic	7E-10	mg/kg-day	1	7E-10	mg/kg-day	DV; EN; RP	30	IRIS	4/12/2022
PCBC TEQ MAMMAL HALFND	Subchronic	2E-08	mg/kg-day	1	2E-08	mg/kg-day	IM	30	ATSDR Final	2/1/2022
Dioxins and Furans [4]										
DIOXIN TEQ MAMMAL HALFND	Chronic	7E-10	mg/kg-day	1	7E-10	mg/kg-day	DV; EN; RP	30	IRIS	4/12/2022
DIOXIN TEQ MAMMAL HALFND	Subchronic	2E-08	mg/kg-day	1	2E-08	mg/kg-day	IM	30	ATSDR Final	2/1/2022
Metals										
Aluminum	Chronic	1	mg/kg-day	1	1	mg/kg-day	NV	100	PPRTV Current	4/12/2022
Aluminum	Subchronic	1	mg/kg-day	1	1	mg/kg-day	NV	100	ATSDR Final	2/1/2022
Antimony	Chronic	0.0004	mg/kg-day	0.15	0.00006	mg/kg-day	HM; OT	1000	IRIS	4/12/2022
Antimony	Subchronic	0.0004	mg/kg-day	0.15	0.00006	mg/kg-day	OT	1000	PPRTV Current	4/12/2022
Arsenic	Chronic	0.0003	mg/kg-day	1	0.0003	mg/kg-day	CV; DM	3	IRIS	4/12/2022
Arsenic	Subchronic	0.005	mg/kg-day	1	0.005	mg/kg-day	DM	10	PPRTV Archive	4/12/2022
Cadmium (Diet)	Chronic	0.001	mg/kg-day	0.025	0.000025	mg/kg-day	UR	10	IRIS	4/12/2022
Cadmium (Diet)	Subchronic	0.0005	mg/kg-day	0.025	0.0000125	mg/kg-day	MS	100	ATSDR Final	2/1/2022
Chromium, Total	Chronic	0.003	mg/kg-day	0.025	0.000075	mg/kg-day	N/A	900	IRIS	4/12/2022
Chromium, Total	Subchronic	0.005	mg/kg-day	0.025	0.000125	mg/kg-day	HM	100	ATSDR Final	2/1/2022

Table A-5.1
Non-Cancer Toxicity Data - Oral/Dermal
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Constituent of Interest	Chronic/ Subchronic [3]	Oral RfD		Oral Absorption Effiency for Dermal [1]	Absorbed RfD for Dermal [2]		Primary Target Organ/System(s)	Combined Uncertainty/ Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Cobalt	Chronic	0.0003	mg/kg-day	1	0.0003	mg/kg-day	EN	3000	PPRTV Current	4/12/2022
Cobalt	Subchronic	0.003	mg/kg-day	1	0.003	mg/kg-day	EN	300	PPRTV Current	4/12/2022
Iron	Chronic	0.7	mg/kg-day	1	0.7	mg/kg-day	GI	1.5	PPRTV Current	4/12/2022
Iron	Subchronic	0.7	mg/kg-day	1	0.7	mg/kg-day	GI	1.5	PPRTV Current	4/12/2022
Manganese (Non-Diet)	Chronic	0.024	mg/kg-day	0.04	0.00096	mg/kg-day	NV	3	IRIS	4/12/2022
Manganese (Non-Diet)	Subchronic	0.024	mg/kg-day	0.04	0.00096	mg/kg-day	NV	3	IRIS	4/12/2022
Thallium	Chronic	0.00001	mg/kg-day	1	0.00001	mg/kg-day	DM	3000	PPRTV Screen	4/12/2022
Thallium	Subchronic	0.00004	mg/kg-day	1	0.00004	mg/kg-day	DM	1000	PPRTV Screen	4/12/2022

Notes:

-- = No Value; mg/kg-day = milligrams per kilogram -day; N/A = None Applicable; RfD = Reference Dose

(1) Source: U.S. Environmental Protection Agency (EPA) July 2004. Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Office of Emergency and Remedial Response. Washington D.C. EPA/540/R/99/005.

(2) To derive the Absorbed RfD for Dermal, the oral RfD is multiplied by the oral absorption efficiency.

(3) If no subchronic toxicity value is available, then the chronic value is used in the calculations.

(4) TEQ indicates 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) Toxic Equivalency.

RfD: Target Organ Source Information:

ATSDR = Agency for Toxic Substance & Disease Registry (https://www.atsdr.cdc.gov)
HEAST = Health Effects Assessment Summary Tables (https://rais.ornl.gov/epa/heast/table1.htm)
IRIS = Integrated Risk Information System (https://www.epa.gov/iris)

PPRTV = Provisional Peer-Reviewed Toxicity Values (https://www.hhpprtv.ornl.gov/)

Target Organ Codes:

CV = Cardiovascular	HM = Hematological	OC = Ocular
DM = Dermal	HP = Hepatic	OT = Other
DV = Developmental	IM = Immune	RP = Reproductive
EN = Endocrine	MS = Musculoskeletal	UR = Urinary
GI = Gastrointestinal	NV = Nervous	

Table A-5.2
Non-Cancer Toxicity Data - Inhalation
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Constituent of Interest	Chronic/ Subchronic [1]	Inhalation RfC		Primary Target Organ/System(s)	Combined Uncertainty/ Modifying Factors	RfC: Target Organ(s)	
		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Semi-volatile Organic Compounds (SVOCs)							
1,2,4,5-Tetrachlorobenzene	Chronic	--	--	--	--	--	4/12/2022
1,2,4,5-Tetrachlorobenzene	Subchronic	--	--	--	--	--	4/12/2022
Benzo(a)anthracene	Chronic	--	--	--	--	--	4/12/2022
Benzo(a)anthracene	Subchronic	--	--	--	--	--	4/12/2022
Benzo(a)pyrene	Chronic	0.000002	mg/m³	DV	3000	IRIS	4/12/2022
Benzo(a)pyrene	Subchronic	0.000002	mg/m³	DV	3000	IRIS	4/12/2022
Benzo(b)fluoranthene	Chronic	--	--	--	--	--	4/12/2022
Benzo(b)fluoranthene	Subchronic	--	--	--	--	--	4/12/2022
Dibenz(a,h)anthracene	Chronic	--	--	--	--	--	4/12/2022
Dibenz(a,h)anthracene	Subchronic	--	--	--	--	--	4/12/2022
Indeno(1,2,3-cd)pyrene	Chronic	--	--	--	--	--	4/12/2022
Indeno(1,2,3-cd)pyrene	Subchronic	--	--	--	--	--	4/12/2022
Pesticides							
Dieldrin	Chronic	--	--	--	--	--	4/12/2022
Dieldrin	Subchronic	--	--	--	--	--	4/12/2022
Polychlorinated Biphenyls (PCBs)							
Aroclor 1254	Chronic	--	--	--	--	--	4/12/2022
Aroclor 1254	Subchronic	--	--	--	--	--	4/12/2022
Aroclor 1260	Chronic	--	--	--	--	--	4/12/2022
Aroclor 1260	Subchronic	--	--	--	--	--	4/12/2022
Polychlorinated Biphenyls (PCBs) - Congeners [2]							
PCBC TEQ MAMMAL HALFND	Chronic	0.00000004	mg/m³	DV; EN; HM; HP; RP; RS	N/A	Cal EPA	4/12/2022
PCBC TEQ MAMMAL HALFND	Subchronic	0.00000004	mg/m³	DV; EN; HM; HP; RP; RS	N/A	Cal EPA	4/12/2022
Dioxins and Furans [2]							
DIOXIN TEQ MAMMAL HALFND	Chronic	0.00000004	mg/m³	DV; EN; HM; HP; RP; RS	N/A	Cal EPA	4/12/2022
DIOXIN TEQ MAMMAL HALFND	Subchronic	0.00000004	mg/m³	DV; EN; HM; HP; RP; RS	N/A	Cal EPA	4/12/2022
Metals							
Aluminum	Chronic	0.005	mg/m³	NV	300	PPRTV Current	4/12/2022
Aluminum	Subchronic	0.005	mg/m³	NV	300	PPRTV Current	4/12/2022
Antimony	Chronic	0.0003	mg/m³	RS	30	ATSDR Final	2/1/2022
Antimony	Subchronic	0.001	mg/m³	RS	100	ATSDR Final	2/1/2022
Arsenic	Chronic	0.000015	mg/m³	CV; DM; DV; NV; RP; RS	N/A	Cal EPA	4/12/2022
Arsenic	Subchronic	0.000015	mg/m³	CV; DM; DV; NV; RP; RS	N/A	Cal EPA	4/12/2022
Cadmium (Diet)	Chronic	0.00001	mg/m³	UR	3	ATSDR Final	2/1/2022
Cadmium (Diet)	Subchronic	0.0009	mg/m³	UR	N/A	PPRTV Archive	4/12/2022
Chromium, Total	Chronic	0.0001	mg/m³	RS	300	IRIS	4/12/2022
Chromium, Total	Subchronic	0.0003	mg/m³	RS	30	ATSDR Final	2/1/2022

Table A-5.2
Non-Cancer Toxicity Data - Inhalation
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Constituent of Interest	Chronic/ Subchronic (1)	Inhalation RfC		Primary Target Organ/System(s)	Combined Uncertainty/ Modifying Factors	RfC: Target Organ(s)	
		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Cobalt	Chronic	0.000006	mg/m³	RS	300	PPRTV Current	4/12/2022
Cobalt	Subchronic	0.00002	mg/m³	RS	100	PPRTV Current	4/12/2022
Iron	Chronic	--	--	--	--	--	4/12/2022
Iron	Subchronic	--	--	--	--	--	4/12/2022
Manganese (Non-Diet)	Chronic	0.00005	mg/m³	NV	1000	IRIS	4/12/2022
Manganese (Non-Diet)	Subchronic	0.00005	mg/m³	NV	1000	IRIS	4/12/2022
Thallium	Chronic	--	--	--	--	--	4/12/2022
Thallium	Subchronic	--	--	--	--	--	4/12/2022

Notes:
-- = No Value
N/A = Not Available
RfC = Reference Concentration
mg/m³ = milligrams per cubic meter
(1) If no subchronic toxicity value is available, then the chronic value is used in the calculations.
(2) TEQ indicates 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) Toxic Equivalency.

Target Organ Source Information:
ATSDR = Agency for Toxic Substance & Disease Registry (https://www.atsdr.cdc.gov)
Cal EPA = California Environmental Protection Agency (https://calepa.ca.gov/)
IRIS = Integrated Risk Information System (https://www.epa.gov/iris)
PPRTV = Provisional Peer-Reviewed Toxicity Values (https://www.hhpprtv.ornl.gov/)

Target Organ Codes:
CV = Cardiovascular
DM = Dermal
DV = Developmental
EN = Endocrine
HM = Hematological
HP = Hepatic
NV = Nervous
RP = Reproductive
RS = Respiratory
UR = Urinary

Table A-6.1
Cancer Toxicity Data - Oral/Dermal
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Constituent of Interest	Oral Cancer Slope Factor		Oral Absorption Effiency for Dermal [1]	Absorbed Cancer Slope Factor for Dermal [2]		Weight of Evidence/ Cancer Guideline Description	Cancer Slope Factor	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Semi-Volatile Organic Compounds (SVOCs)								
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	4/12/2022
Benzo(a)anthracene	0.1	kg-day/mg	1	0.1	kg-day/mg	Carcinogenic to Humans	BaP x TEF	4/12/2022
Benzo(a)pyrene	1	kg-day/mg	1	1	kg-day/mg	Carcinogenic to Humans	IRIS	4/12/2022
Benzo(b)fluoranthene	0.1	kg-day/mg	1	0.1	kg-day/mg	Carcinogenic to Humans	BaP x TEF	4/12/2022
Dibenz(a,h)anthracene	1	kg-day/mg	1	1	kg-day/mg	Carcinogenic to Humans	BaP x TEF	4/12/2022
Indeno(1,2,3-cd)pyrene	0.1	kg-day/mg	1	0.1	kg-day/mg	Carcinogenic to Humans	BaP x TEF	4/12/2022
Pesticides								
Dieldrin	16	kg-day/mg	1	16	kg-day/mg	B2	IRIS	4/12/2022
Polychlorinated Biphenyls (PCBs)								
Aroclor 1254	2	kg-day/mg	1	2	kg-day/mg	B2	IRIS[3]	4/12/2022
Aroclor 1260	2	kg-day/mg	1	2	kg-day/mg	B2	IRIS[3]	4/12/2022
Polychlorinated Biphenyls (PCBs) - Congeners [4]								
PCBC TEQ MAMMAL HALFND	130000	kg-day/mg	1	130000	kg-day/mg	N/A	Cal EPA	4/12/2022
Dioxins and Furans [4]								
DIOXIN TEQ MAMMAL HALFND	130000	kg-day/mg	1	130000	kg-day/mg	N/A	Cal EPA	4/12/2022
Metals								
Aluminum	--	--	--	--	--	--	--	4/12/2022
Antimony	--	--	--	--	--	--	--	4/12/2022
Arsenic	1.5	kg-day/mg	1	1.5	kg-day/mg	A	IRIS	4/12/2022
Cadmium (Diet)	--	--	--	--	--	--	--	4/12/2022
Chromium, Total	0.5	kg-day/mg	0.025	20	kg-day/mg	N/A	Cal EPA	4/12/2022
Cobalt	--	--	--	--	--	--	--	4/12/2022
Iron	--	--	--	--	--	--	--	4/12/2022
Manganese (Non-Diet)	--	--	--	--	--	--	--	4/12/2022
Thallium	--	--	--	--	--	--	--	4/12/2022

Notes:

-- = No Value; $(mg/kg\text{-}day)^{-1}$ = one over milligrams per kilogram-day

(1) Source: U.S. Environmental Protection Agency (EPA) July 2004. Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Office of Emergency and Remedial Response. Washington D.C. EPA/540/R/99/005.

(2) To derive the Absorbed Cancer Slope Factor for Dermal, the oral cancer slope factor is divided by the oral absorption efficiency for dermal.

(3) Surrogate toxciity for PCBs (high toxicity and peristence) selected in IRIS.

(4) TEQ indicates 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) Toxic Equivalency.

Sources:

BaP x TEF = Carcinogencity determined by adjusting benzo(a)pyrene (BaP) by a toxicity equivalence factor (TEF)
TEFs used were 0.1 (benzo[a]anthracene, benzo[b]fluoranthene, indeno[(1,2,3-cd])pyrene) and 1 (dibenz[a,h]anthracene).

Cal EPA = California Environmental Protection Agency (https://calepa.ca.gov/)

IRIS = Integrated Risk Information System (https://www.epa.gov/iris)

USEPA, 1986 = Guidelines for Carcinogen Risk Assessment

USEPA, 2005 = Guidelines for Carcinogen Risk Assessment

Weight of Evidence:

A = Human Carcinogen (USEPA, 1986)

B2 = Probable Human Carcinogen - Based on Sufficient Evidence in Animals (USEPA, 1986)
Carcinogenic to Humans (USEPA, 2005)

N/A = Not Available

Table A-6.2
Cancer Toxicity Data - Inhalation
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Constituent of Interest	Inhalation Unit Risk		Weight of Evidence/ Cancer Guideline Description	Inhalation Unit Risk	
	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Semi-Volatile Organic Compounds (SVOCs)					
1,2,4,5-Tetrachlorobenzene	--	--	--	--	4/12/2022
Benzo(a)anthracene	0.00006	$m^3/\mu g$	Carcinogenic to Humans	BaP x TEF	4/12/2022
Benzo(a)pyrene	0.0006	$m^3/\mu g$	Carcinogenic to Humans	IRIS	4/12/2022
Benzo(b)fluoranthene	0.00006	$m^3/\mu g$	Carcinogenic to Humans	BaP x TEF	4/12/2022
Dibenz(a,h)anthracene	0.0006	$m^3/\mu g$	Carcinogenic to Humans	BaP x TEF	4/12/2022
Indeno(1,2,3-cd)pyrene	0.00006	$m^3/\mu g$	Carcinogenic to Humans	BaP x TEF	4/12/2022
Pesticides					
Dieldrin	0.0046	$m^3/\mu g$	B2	IRIS	4/12/2022
Polychlorinated Biphenyls (PCBs)					
Aroclor 1254	0.000571	$m^3/\mu g$	B2	IRIS(1)	4/12/2022
Aroclor 1260	0.000571	$m^3/\mu g$	B2	IRIS(1)	4/12/2022
Polychlorinated Biphenyls (PCBs) - Congeners (2)					
PCBC TEQ MAMMAL HALFND	38	$m^3/\mu g$	N/A	Cal EPA	4/12/2022
Dioxins and Furans (2)					
DIOXIN TEQ MAMMAL HALFND	38	$m^3/\mu g$	N/A	Cal EPA	4/12/2022
Metals					
Aluminum	--	--	--	--	4/12/2022
Antimony	--	--	--	--	4/12/2022
Arsenic	0.0043	$m^3/\mu g$	A	IRIS	4/12/2022
Cadmium (Diet)	0.0018	$m^3/\mu g$	B1	IRIS	4/12/2022
Chromium, Total	0.084	$m^3/\mu g$	Known/Likely Human Carcinogen	IRIS(3)	4/12/2022
Cobalt	0.009	$m^3/\mu g$	LI	PPRTV Current	4/12/2022
Iron	--	--	--	--	4/12/2022
Manganese (Non-Diet)	--	--	--	--	4/12/2022
Thallium	--	--	--	--	4/12/2022

Notes:

-- = No Value

$(\mu g/m^3)$-1 = one over micrograms per cubic meter

(1) Surrogate toxciity for PCBs (high toxicity and peristence) selected in IRIS.

(2) TEQ indicates 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) Toxic Equivalency.

(3) IRIS IUR (0.012 $m^3/\mu g$) adjusted by a factor of 7 per USEPA RSL guidance.

Sources:

BaP x TEF = Carcinogencity determined by adjusting benzo(a)pyrene (BaP) by a toxicity equivalence factor (TEF)

TEFs used were 0.1 (benzo[a]anthracene, benzo[b]fluoranthene, indeno[(1,2,3-cd])pyrene) and 1 (dibenz[a,h]anthracene).

Cal EPA = California Environmental Protection Agency (https://calepa.ca.gov/)

IRIS = Integrated Risk Information System (https://www.epa.gov/iris)

PPRTV = Provisional Peer Reviewed Toxicity Values for Superfund (https://hhpprtv.ornl.gov/)

USEPA, 1986 = Guidelines for Carcinogen Risk Assessment

USEPA, 1996 = Proposed Guidelines for Carcinogen Risk Assessment

USEPA, 2005 = Guidelines for Carcinogen Risk Assessment

Weight of Evidence:

A = Human Carcinogen (USEPA, 1986)

B1 = Probable Human Carcinogen - Based on Limited Evidence in Humans (USEPA, 1986)

B2 = Probable Human Carcinogen - Based on Sufficient Evidence in Animals (USEPA, 1986)

Carcinogenic to Humans (USEPA, 2005)

Known/Likely Human Carcinogen (USEPA, 1996)

LI = Likely to be Carcinogenic to Humans (PPRTV)

Table A-7.1
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Adult) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	0 - 0.5 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	(2)	--	--	--	--	1.37E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0005
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	(2)	--	--	--	--	1.92E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	(2)	--	--	--	--	3.48E-11	mg/kg-day	7.00E-10	mg/kg-day	0.05
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	(2)	--	--	--	--	2.49E-11	mg/kg-day	7.00E-10	mg/kg-day	0.04
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	(2)	--	--	--	--	1.02E-02	mg/kg-day	1.00E+00	mg/kg-day	0.01
				Arsenic	8.64E+00	mg/kg	(2)	--	--	--	--	6.21E-06	mg/kg-day	3.00E-04	mg/kg-day	0.02
				Chromium, Total	1.26E+01	mg/kg	(2)	--	--	--	--	1.51E-05	mg/kg-day	3.00E-03	mg/kg-day	0.005
				Cobalt	1.10E+01	mg/kg	(2)	--	--	--	--	1.32E-05	mg/kg-day	3.00E-04	mg/kg-day	0.04
				Iron	2.50E+04	mg/kg	(2)	--	--	--	--	3.00E-02	mg/kg-day	7.00E-01	mg/kg-day	0.04
				Manganese (Non-Diet)	4.72E+02	mg/kg	(2)	--	--	--	--	5.66E-04	mg/kg-day	2.40E-02	mg/kg-day	0.02
				Thallium	1.44E-01	mg/kg	(2)	--	--	--	--	1.73E-07	mg/kg-day	1.00E-05	mg/kg-day	0.02
			Exp. Route Total								--					0.2
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	(2)	--	--	--	--	7.50E-08	mg/kg-day	3.00E-04	mg/kg-day	0.0003
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	(2)	--	--	--	--	1.13E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	(2)	--	--	--	--	4.41E-12	mg/kg-day	7.00E-10	mg/kg-day	0.006
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	(2)	--	--	--	--	3.15E-12	mg/kg-day	7.00E-10	mg/kg-day	0.005
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	(2)	--	--	--	--	4.32E-04	mg/kg-day	1.00E+00	mg/kg-day	0.0004
				Arsenic	8.64E+00	mg/kg	(2)	--	--	--	--	1.31E-06	mg/kg-day	3.00E-04	mg/kg-day	0.004
				Chromium, Total	1.26E+01	mg/kg	(2)	--	--	--	--	6.37E-07	mg/kg-day	7.50E-05	mg/kg-day	0.008
				Cobalt	1.10E+01	mg/kg	(2)	--	--	--	--	5.58E-07	mg/kg-day	3.00E-04	mg/kg-day	0.002
				Iron	2.50E+04	mg/kg	(2)	--	--	--	--	1.27E-03	mg/kg-day	7.00E-01	mg/kg-day	0.002
				Manganese (Non-Diet)	4.72E+02	mg/kg	(2)	--	--	--	--	2.39E-05	mg/kg-day	9.60E-04	mg/kg-day	0.02
				Thallium	1.44E-01	mg/kg	(2)	--	--	--	--	7.29E-09	mg/kg-day	1.00E-05	mg/kg-day	0.0007
			Exp. Route Total								--					0.05
		Exp. Point Total									--					0.3
	Exp. Medium Total										--					0.3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	8.38E-08	µg/m³	(2)	--	--	--	--	8.04E-08	µg/m³	2.00E-03	µg/m³	0.00004
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.18E-06	µg/m³	(2)	--	--	--	--	1.13E-06	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.13E-11	µg/m³	(2)	--	--	--	--	2.05E-11	µg/m³	4.00E-05	µg/m³	0.0000005
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.53E-11	µg/m³	(2)	--	--	--	--	1.46E-11	µg/m³	4.00E-05	µg/m³	0.0000004

Table A-7.1
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Adult) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	6.28E-03	µg/m³	(2)	--	--	--	--	6.02E-03	µg/m³	5.00E+00	µg/m³	0.001
				Arsenic	6.35E-06	µg/m³	(2)	--	--	--	--	6.09E-06	µg/m³	1.50E-02	µg/m³	0.0004
				Chromium, Total	9.25E-06	µg/m³	(2)	--	--	--	--	8.87E-06	µg/m³	1.00E-01	µg/m³	0.00009
				Cobalt	8.10E-06	µg/m³	(2)	--	--	--	--	7.77E-06	µg/m³	6.00E-03	µg/m³	0.001
				Iron	1.84E-02	µg/m³	(2)	--	--	--	--	1.76E-02	µg/m³	--	--	--
				Manganese (Non-Diet)	3.47E-04	µg/m³	(2)	--	--	--	--	3.33E-04	µg/m³	5.00E-02	µg/m³	0.007
				Thallium	1.06E-07	µg/m³	(2)	--	--	--	--	1.02E-07	µg/m³	--	--	--
			Exp. Route Total								--					0.01
		Exp. Point Total									--					0.01
		Vapors above Site	Inhalation													
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	4.33E-03	µg/m³	(2)	--	--	--	--	4.15E-03	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.00E-08	µg/m³	(2)	--	--	--	--	9.62E-09	µg/m³	4.00E-05	µg/m³	0.0002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	7.18E-09	µg/m³	(2)	--	--	--	--	6.89E-09	µg/m³	4.00E-05	µg/m³	0.0002
			Exp. Route Total								--					0.0004
		Exp. Point Total									--					0.0004
	Exp. Medium Total										--					0.01
Medium Total											--					0.3
Notes:											**--**					**0.3**

Total of Receptor Risks Across All Media — **Total of Receptor Hazards Across All Media**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.2
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Child) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	0 - 0.5 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	(2)	--	--	--	--	1.46E-06	mg/kg-day	3.00E-04	mg/kg-day	0.005
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	(2)	--	--	--	--	2.05E-05	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	(2)	--	--	--	--	3.71E-10	mg/kg-day	7.00E-10	mg/kg-day	0.5
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	(2)	--	--	--	--	2.66E-10	mg/kg-day	7.00E-10	mg/kg-day	0.4
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	(2)	--	--	--	--	1.09E-01	mg/kg-day	1.00E+00	mg/kg-day	0.1
				Arsenic	8.64E+00	mg/kg	(2)	--	--	--	--	6.63E-05	mg/kg-day	3.00E-04	mg/kg-day	0.2
				Chromium, Total	1.26E+01	mg/kg	(2)	--	--	--	--	1.61E-04	mg/kg-day	3.00E-03	mg/kg-day	0.05
				Cobalt	1.10E+01	mg/kg	(2)	--	--	--	--	1.41E-04	mg/kg-day	3.00E-04	mg/kg-day	0.5
				Iron	2.50E+04	mg/kg	(2)	--	--	--	--	3.20E-01	mg/kg-day	7.00E-01	mg/kg-day	0.5
				Manganese (Non-Diet)	4.72E+02	mg/kg	(2)	--	--	--	--	6.04E-03	mg/kg-day	2.40E-02	mg/kg-day	0.3
				Thallium	1.44E-01	mg/kg	(2)	--	--	--	--	1.84E-06	mg/kg-day	1.00E-05	mg/kg-day	0.2
			Exp. Route Total								--					3
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	(2)	--	--	--	--	4.50E-07	mg/kg-day	3.00E-04	mg/kg-day	0.001
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	(2)	--	--	--	--	6.80E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	(2)	--	--	--	--	2.64E-11	mg/kg-day	7.00E-10	mg/kg-day	0.04
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	(2)	--	--	--	--	1.89E-11	mg/kg-day	7.00E-10	mg/kg-day	0.03
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	(2)	--	--	--	--	2.59E-03	mg/kg-day	1.00E+00	mg/kg-day	0.003
				Arsenic	8.64E+00	mg/kg	(2)	--	--	--	--	7.86E-06	mg/kg-day	3.00E-04	mg/kg-day	0.03
				Chromium, Total	1.26E+01	mg/kg	(2)	--	--	--	--	3.82E-06	mg/kg-day	7.50E-05	mg/kg-day	0.05
				Cobalt	1.10E+01	mg/kg	(2)	--	--	--	--	3.34E-06	mg/kg-day	3.00E-04	mg/kg-day	0.01
				Iron	2.50E+04	mg/kg	(2)	--	--	--	--	7.59E-03	mg/kg-day	7.00E-01	mg/kg-day	0.01
				Manganese (Non-Diet)	4.72E+02	mg/kg	(2)	--	--	--	--	1.43E-04	mg/kg-day	9.60E-04	mg/kg-day	0.1
				Thallium	1.44E-01	mg/kg	(2)	--	--	--	--	4.37E-08	mg/kg-day	1.00E-05	mg/kg-day	0.004
			Exp. Route Total								--					0.3
		Exp. Point Total									--					3
	Exp. Medium Total										--					3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	8.38E-08	µg/m³	(2)	--	--	--	--	8.04E-08	µg/m³	2.00E-03	µg/m³	0.00004
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.18E-06	µg/m³	(2)	--	--	--	--	1.13E-06	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.13E-11	µg/m³	(2)	--	--	--	--	2.05E-11	µg/m³	4.00E-05	µg/m³	0.0000005
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.53E-11	µg/m³	(2)	--	--	--	--	1.46E-11	µg/m³	4.00E-05	µg/m³	0.0000004

Table A-7.2
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Child) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	6.28E-03	µg/m³	(2)	--	--	--	--	6.02E-03	µg/m³	5.00E+00	µg/m³	0.001
				Arsenic	6.35E-06	µg/m³	(2)	--	--	--	--	6.09E-06	µg/m³	1.50E-02	µg/m³	0.0004
				Chromium, Total	9.25E-06	µg/m³	(2)	--	--	--	--	8.87E-06	µg/m³	1.00E-01	µg/m³	0.00009
				Cobalt	8.10E-06	µg/m³	(2)	--	--	--	--	7.77E-06	µg/m³	6.00E-03	µg/m³	0.001
				Iron	1.84E-02	µg/m³	(2)	--	--	--	--	1.76E-02	µg/m³	--	--	--
				Manganese (Non-Diet)	3.47E-04	µg/m³	(2)	--	--	--	--	3.33E-04	µg/m³	5.00E-02	µg/m³	0.007
				Thallium	1.06E-07	µg/m³	(2)	--	--	--	--	1.02E-07	µg/m³	--	--	--
			Exp. Route Total								--					0.01
		Exp. Point Total									--					0.01
		Vapors above Site	Inhalation													
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	4.33E-03	µg/m³	(2)	--	--	--	--	4.15E-03	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.00E-08	µg/m³	(2)	--	--	--	--	9.62E-09	µg/m³	4.00E-05	µg/m³	0.0002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	7.18E-09	µg/m³	(2)	--	--	--	--	6.89E-09	µg/m³	4.00E-05	µg/m³	0.0002
			Exp. Route Total								--					0.0004
		Exp. Point Total									--					0.0004
	Exp. Medium Total										--					0.01
Medium Total											--					3
Notes:											**--**					**3**

Total of Receptor Risks Across All Media | **Total of Receptor Hazards Across All Media**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.3
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Lifetime) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	0 - 0.5 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	7.44E-07	mg/kg-day	1.00E+00	1/(mg/kg-day)	7E-07	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	2.30E-06	mg/kg-day	2.00E+00	1/(mg/kg-day)	5E-06	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	4.17E-11	mg/kg-day	1.30E+05	1/(mg/kg-day)	5E-06	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	2.99E-11	mg/kg-day	1.30E+05	1/(mg/kg-day)	4E-06	(2)	--	--	--	--
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	1.23E-02	mg/kg-day	--	--	--	(2)	--	--	--	--
				Arsenic	8.64E+00	mg/kg	7.46E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	1E-05	(2)	--	--	--	--
				Chromium, Total	1.26E+01	mg/kg	8.21E-05	mg/kg-day	5.00E-01	1/(mg/kg-day)	4E-05	(2)	--	--	--	--
				Cobalt	1.10E+01	mg/kg	1.59E-05	mg/kg-day	--	--	--	(2)	--	--	--	--
				Iron	2.50E+04	mg/kg	3.60E-02	mg/kg-day	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	4.72E+02	mg/kg	6.79E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Thallium	1.44E-01	mg/kg	2.07E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
			Exp. Route Total								7E-05					--
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	2.48E-07	mg/kg-day	1.00E+00	1/(mg/kg-day)	2E-07	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	9.06E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-06	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	3.52E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	5E-07	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	2.52E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	3E-07	(2)	--	--	--	--
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	3.46E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Arsenic	8.64E+00	mg/kg	1.05E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	2E-06	(2)	--	--	--	--
				Chromium, Total	1.26E+01	mg/kg	2.11E-06	mg/kg-day	2.00E+01	1/(mg/kg-day)	4E-05	(2)	--	--	--	--
				Cobalt	1.10E+01	mg/kg	4.46E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
				Iron	2.50E+04	mg/kg	1.01E-03	mg/kg-day	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	4.72E+02	mg/kg	1.91E-05	mg/kg-day	--	--	--	(2)	--	--	--	--
				Thallium	1.44E-01	mg/kg	5.83E-09	mg/kg-day	--	--	--	(2)	--	--	--	--
			Exp. Route Total								5E-05					--
		Exp. Point Total									1E-04					--
	Exp. Medium Total										1E-04					--
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	8.38E-08	µg/m³	8.27E-08	µg/m³	6.00E-04	m³/µg	5E-11	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.18E-06	µg/m³	4.19E-07	µg/m³	5.71E-04	m³/µg	2E-10	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.13E-11	µg/m³	7.60E-12	µg/m³	3.80E+01	m³/µg	3E-10	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.53E-11	µg/m³	5.44E-12	µg/m³	3.80E+01	m³/µg	2E-10	(2)	--	--	--	--

Table A-7.3
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Lifetime) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	6.28E-03	µg/m³	2.24E-03	µg/m³	--	--	--	(2)	--	--	--	--
				Arsenic	6.35E-06	µg/m³	2.26E-06	µg/m³	4.30E-03	m³/µg	1E-08	(2)	--	--	--	--
				Chromium, Total	9.25E-06	µg/m³	9.12E-06	µg/m³	8.40E-02	m³/µg	8E-07	(2)	--	--	--	--
				Cobalt	8.10E-06	µg/m³	2.89E-06	µg/m³	9.00E-03	m³/µg	3E-08	(2)	--	--	--	--
				Iron	1.84E-02	µg/m³	6.55E-03	µg/m³	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	3.47E-04	µg/m³	1.24E-04	µg/m³	--	--	--	(2)	--	--	--	--
				Thallium	1.06E-07	µg/m³	3.77E-08	µg/m³	--	--	--	(2)	--	--	--	--
			Exp. Route Total								8E-07					--
		Exp. Point Total									8E-07					--
		Vapors above Site	Inhalation													
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	4.33E-03	µg/m³	1.54E-03	µg/m³	5.71E-04	m³/µg	9E-07	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.00E-08	µg/m³	3.57E-09	µg/m³	3.80E+01	m³/µg	1E-07	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	7.18E-09	µg/m³	2.56E-09	µg/m³	3.80E+01	m³/µg	1E-07	(2)	--	--	--	--
			Exp. Route Total								1E-06					--
		Exp. Point Total									1E-06					--
	Exp. Medium Total										2E-06					--
Medium Total											1E-04					--
Notes:											**Total of Receptor Risks Across All Media**					**Total of Receptor Hazards Across All Media**
											1E-04					**--**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.4a
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 8.8 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	(2)	--	--	--	--	1.45E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0005
				Benzo(a)anthracene	5.09E-01	mg/kg	(2)	--	--	--	--	6.10E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	(2)	--	--	--	--	4.10E-07	mg/kg-day	3.00E-04	mg/kg-day	0.001
				Benzo(b)fluoranthene	6.90E-01	mg/kg	(2)	--	--	--	--	8.27E-07	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	(2)	--	--	--	--	1.81E-08	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	(2)	--	--	--	--	2.12E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	(2)	--	--	--	--	4.76E-09	mg/kg-day	5.00E-05	mg/kg-day	0.0001
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	(2)	--	--	--	--	7.40E-08	mg/kg-day	2.00E-05	mg/kg-day	0.004
				Aroclor 1260	1.18E+00	mg/kg	(2)	--	--	--	--	1.41E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	(2)	--	--	--	--	2.74E-11	mg/kg-day	7.00E-10	mg/kg-day	0.04
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	(2)	--	--	--	--	1.43E-11	mg/kg-day	7.00E-10	mg/kg-day	0.02
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	(2)	--	--	--	--	1.02E-02	mg/kg-day	1.00E+00	mg/kg-day	0.01
				Antimony	9.23E-01	mg/kg	(2)	--	--	--	--	1.11E-06	mg/kg-day	4.00E-04	mg/kg-day	0.003
				Arsenic	1.22E+01	mg/kg	(2)	--	--	--	--	8.75E-06	mg/kg-day	3.00E-04	mg/kg-day	0.03
				Cadmium (Diet)	3.32E-01	mg/kg	(2)	--	--	--	--	3.98E-07	mg/kg-day	1.00E-03	mg/kg-day	0.0004
				Chromium, Total	1.48E+01	mg/kg	(2)	--	--	--	--	1.78E-05	mg/kg-day	3.00E-03	mg/kg-day	0.006
				Cobalt	1.03E+01	mg/kg	(2)	--	--	--	--	1.24E-05	mg/kg-day	3.00E-04	mg/kg-day	0.04
				Iron	2.24E+04	mg/kg	(2)	--	--	--	--	2.69E-02	mg/kg-day	7.00E-01	mg/kg-day	0.04
				Manganese (Non-Diet)	4.20E+02	mg/kg	(2)	--	--	--	--	5.03E-04	mg/kg-day	2.40E-02	mg/kg-day	0.02
				Thallium	1.52E-01	mg/kg	(2)	--	--	--	--	1.82E-07	mg/kg-day	1.00E-05	mg/kg-day	0.02
			Exp. Route Total								--					0.2
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	(2)	--	--	--	--	6.12E-08	mg/kg-day	3.00E-04	mg/kg-day	0.0002
				Benzo(a)anthracene	5.09E-01	mg/kg	(2)	--	--	--	--	3.35E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	(2)	--	--	--	--	2.25E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0008
				Benzo(b)fluoranthene	6.90E-01	mg/kg	(2)	--	--	--	--	4.54E-07	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	(2)	--	--	--	--	9.93E-09	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	(2)	--	--	--	--	1.16E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	(2)	--	--	--	--	2.01E-09	mg/kg-day	5.00E-05	mg/kg-day	0.00004
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	(2)	--	--	--	--	4.37E-08	mg/kg-day	2.00E-05	mg/kg-day	0.002
				Aroclor 1260	1.18E+00	mg/kg	(2)	--	--	--	--	8.35E-07	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	(2)	--	--	--	--	3.47E-12	mg/kg-day	7.00E-10	mg/kg-day	0.005
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	(2)	--	--	--	--	1.81E-12	mg/kg-day	7.00E-10	mg/kg-day	0.003

Table A-7.4a
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	(2)	--	--	--	--	4.31E-04	mg/kg-day	1.00E+00	mg/kg-day	0.0004
				Antimony	9.23E-01	mg/kg	(2)	--	--	--	--	4.67E-08	mg/kg-day	6.00E-05	mg/kg-day	0.0008
				Arsenic	1.22E+01	mg/kg	(2)	--	--	--	--	1.85E-06	mg/kg-day	3.00E-04	mg/kg-day	0.006
				Cadmium (Diet)	3.32E-01	mg/kg	(2)	--	--	--	--	1.68E-09	mg/kg-day	2.50E-05	mg/kg-day	0.00007
				Chromium, Total	1.48E+01	mg/kg	(2)	--	--	--	--	7.51E-07	mg/kg-day	7.50E-05	mg/kg-day	0.01
				Cobalt	1.03E+01	mg/kg	(2)	--	--	--	--	5.22E-07	mg/kg-day	3.00E-04	mg/kg-day	0.002
				Iron	2.24E+04	mg/kg	(2)	--	--	--	--	1.13E-03	mg/kg-day	7.00E-01	mg/kg-day	0.002
				Manganese (Non-Diet)	4.20E+02	mg/kg	(2)	--	--	--	--	2.12E-05	mg/kg-day	9.60E-04	mg/kg-day	0.02
				Thallium	1.52E-01	mg/kg	(2)	--	--	--	--	7.69E-09	mg/kg-day	1.00E-05	mg/kg-day	0.0008
			Exp. Route Total								--					0.05
		Exp. Point Total									--					0.3
	Exp. Medium Total										--					0.3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	8.90E-08	µg/m³	(2)	--	--	--	--	8.53E-08	µg/m³	--	--	--
				Benzo(a)anthracene	3.74E-07	µg/m³	(2)	--	--	--	--	3.59E-07	µg/m³	--	--	--
				Benzo(a)pyrene	2.51E-07	µg/m³	(2)	--	--	--	--	2.41E-07	µg/m³	2.00E-03	µg/m³	0.0001
				Benzo(b)fluoranthene	5.07E-07	µg/m³	(2)	--	--	--	--	4.87E-07	µg/m³	--	--	--
				Dibenz(a,h)anthracene	1.11E-08	µg/m³	(2)	--	--	--	--	1.06E-08	µg/m³	--	--	--
				Indeno(1,2,3-cd)pyrene	1.30E-07	µg/m³	(2)	--	--	--	--	1.25E-07	µg/m³	--	--	--
				Pesticides												
				Dieldrin	2.92E-09	µg/m³	(2)	--	--	--	--	2.80E-09	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	4.54E-08	µg/m³	(2)	--	--	--	--	4.35E-08	µg/m³	--	--	--
				Aroclor 1260	8.67E-07	µg/m³	(2)	--	--	--	--	8.31E-07	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.68E-11	µg/m³	(2)	--	--	--	--	1.61E-11	µg/m³	4.00E-05	µg/m³	0.0000004
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	8.74E-12	µg/m³	(2)	--	--	--	--	8.38E-12	µg/m³	4.00E-05	µg/m³	0.0000002
				Metals (Total)												
				Aluminum	6.26E-03	µg/m³	(2)	--	--	--	--	6.00E-03	µg/m³	5.00E+00	µg/m³	0.001
				Antimony	6.79E-07	µg/m³	(2)	--	--	--	--	6.51E-07	µg/m³	3.00E-01	µg/m³	0.000002
				Arsenic	8.94E-06	µg/m³	(2)	--	--	--	--	8.57E-06	µg/m³	1.50E-02	µg/m³	0.0006
				Cadmium (Diet)	2.44E-07	µg/m³	(2)	--	--	--	--	2.34E-07	µg/m³	1.00E-02	µg/m³	0.00002
				Chromium, Total	1.09E-05	µg/m³	(2)	--	--	--	--	1.05E-05	µg/m³	1.00E-01	µg/m³	0.0001
				Cobalt	7.59E-06	µg/m³	(2)	--	--	--	--	7.28E-06	µg/m³	6.00E-03	µg/m³	0.001
				Iron	1.65E-02	µg/m³	(2)	--	--	--	--	1.58E-02	µg/m³	--	--	--
				Manganese (Non-Diet)	3.09E-04	µg/m³	(2)	--	--	--	--	2.96E-04	µg/m³	5.00E-02	µg/m³	0.006
				Thallium	1.12E-07	µg/m³	(2)	--	--	--	--	1.07E-07	µg/m³	--	--	--
			Exp. Route Total								--					0.009
		Exp. Point Total									--					0.009
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	2.86E-03	µg/m³	(2)	--	--	--	--	2.74E-03	µg/m³	--	--	--
				Benzo(a)anthracene	6.75E-05	µg/m³	(2)	--	--	--	--	6.47E-05	µg/m³	--	--	--

Table A-7.4a
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	1.88E-04	µg/m³	(2)	--	--	--	--	1.80E-04	µg/m³	--	--	--
				Aroclor 1260	3.19E-03	µg/m³	(2)	--	--	--	--	3.06E-03	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	7.89E-09	µg/m³	(2)	--	--	--	--	7.56E-09	µg/m³	4.00E-05	µg/m³	0.0002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	4.11E-09	µg/m³	(2)	--	--	--	--	3.94E-09	µg/m³	4.00E-05	µg/m³	0.0001
			Exp. Route Total								--					0.0003
		Exp. Point Total									--					0.0003
	Exp. Medium Total										--					0.009
Medium Total											--					0.3
Notes:											**Total of Receptor Risks Across All Media**					**Total of Receptor Hazards Across All Media**
											--					**0.3**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.4b
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 8.8 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	(2)	--	--	--	--	1.45E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0005
				Benzo(a)anthracene	5.09E-01	mg/kg	(2)	--	--	--	--	6.10E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	(2)	--	--	--	--	4.10E-07	mg/kg-day	3.00E-04	mg/kg-day	0.001
				Benzo(b)fluoranthene	6.90E-01	mg/kg	(2)	--	--	--	--	8.27E-07	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	(2)	--	--	--	--	1.81E-08	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	(2)	--	--	--	--	2.12E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	(2)	--	--	--	--	4.76E-09	mg/kg-day	5.00E-05	mg/kg-day	0.0001
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	(2)	--	--	--	--	7.40E-08	mg/kg-day	2.00E-05	mg/kg-day	0.004
				Aroclor 1260	2.40E+01	mg/kg	(2)	--	--	--	--	2.88E-05	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	(2)	--	--	--	--	2.74E-11	mg/kg-day	7.00E-10	mg/kg-day	0.04
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	(2)	--	--	--	--	1.43E-11	mg/kg-day	7.00E-10	mg/kg-day	0.02
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	(2)	--	--	--	--	1.02E-02	mg/kg-day	1.00E+00	mg/kg-day	0.01
				Antimony	9.23E-01	mg/kg	(2)	--	--	--	--	1.11E-06	mg/kg-day	4.00E-04	mg/kg-day	0.003
				Arsenic	1.22E+01	mg/kg	(2)	--	--	--	--	8.75E-06	mg/kg-day	3.00E-04	mg/kg-day	0.03
				Cadmium (Diet)	3.32E-01	mg/kg	(2)	--	--	--	--	3.98E-07	mg/kg-day	1.00E-03	mg/kg-day	0.0004
				Chromium, Total	1.48E+01	mg/kg	(2)	--	--	--	--	1.78E-05	mg/kg-day	3.00E-03	mg/kg-day	0.006
				Cobalt	1.03E+01	mg/kg	(2)	--	--	--	--	1.24E-05	mg/kg-day	3.00E-04	mg/kg-day	0.04
				Iron	2.24E+04	mg/kg	(2)	--	--	--	--	2.69E-02	mg/kg-day	7.00E-01	mg/kg-day	0.04
				Manganese (Non-Diet)	4.20E+02	mg/kg	(2)	--	--	--	--	5.03E-04	mg/kg-day	2.40E-02	mg/kg-day	0.02
				Thallium	1.52E-01	mg/kg	(2)	--	--	--	--	1.82E-07	mg/kg-day	1.00E-05	mg/kg-day	0.02
			Exp. Route Total								--					0.2
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	(2)	--	--	--	--	6.12E-08	mg/kg-day	3.00E-04	mg/kg-day	0.0002
				Benzo(a)anthracene	5.09E-01	mg/kg	(2)	--	--	--	--	3.35E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	(2)	--	--	--	--	2.25E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0008
				Benzo(b)fluoranthene	6.90E-01	mg/kg	(2)	--	--	--	--	4.54E-07	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	(2)	--	--	--	--	9.93E-09	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	(2)	--	--	--	--	1.16E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	(2)	--	--	--	--	2.01E-09	mg/kg-day	5.00E-05	mg/kg-day	0.00004
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	(2)	--	--	--	--	4.37E-08	mg/kg-day	2.00E-05	mg/kg-day	0.002
				Aroclor 1260	2.40E+01	mg/kg	(2)	--	--	--	--	1.70E-05	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	(2)	--	--	--	--	3.47E-12	mg/kg-day	7.00E-10	mg/kg-day	0.005
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	(2)	--	--	--	--	1.81E-12	mg/kg-day	7.00E-10	mg/kg-day	0.003

Table A-7.4b
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	(2)	--	--	--	--	4.31E-04	mg/kg-day	1.00E+00	mg/kg-day	0.0004
				Antimony	9.23E-01	mg/kg	(2)	--	--	--	--	4.67E-08	mg/kg-day	6.00E-05	mg/kg-day	0.0008
				Arsenic	1.22E+01	mg/kg	(2)	--	--	--	--	1.85E-06	mg/kg-day	3.00E-04	mg/kg-day	0.006
				Cadmium (Diet)	3.32E-01	mg/kg	(2)	--	--	--	--	1.68E-09	mg/kg-day	2.50E-05	mg/kg-day	0.00007
				Chromium, Total	1.48E+01	mg/kg	(2)	--	--	--	--	7.51E-07	mg/kg-day	7.50E-05	mg/kg-day	0.01
				Cobalt	1.03E+01	mg/kg	(2)	--	--	--	--	5.22E-07	mg/kg-day	3.00E-04	mg/kg-day	0.002
				Iron	2.24E+04	mg/kg	(2)	--	--	--	--	1.13E-03	mg/kg-day	7.00E-01	mg/kg-day	0.002
				Manganese (Non-Diet)	4.20E+02	mg/kg	(2)	--	--	--	--	2.12E-05	mg/kg-day	9.60E-04	mg/kg-day	0.02
				Thallium	1.52E-01	mg/kg	(2)	--	--	--	--	7.69E-09	mg/kg-day	1.00E-05	mg/kg-day	0.0008
			Exp. Route Total								--					0.05
		Exp. Point Total									--					0.3
	Exp. Medium Total										--					0.3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	8.90E-08	µg/m³	(2)	--	--	--	--	8.53E-08	µg/m³	--	--	--
				Benzo(a)anthracene	3.74E-07	µg/m³	(2)	--	--	--	--	3.59E-07	µg/m³	--	--	--
				Benzo(a)pyrene	2.51E-07	µg/m³	(2)	--	--	--	--	2.41E-07	µg/m³	2.00E-03	µg/m³	0.0001
				Benzo(b)fluoranthene	5.07E-07	µg/m³	(2)	--	--	--	--	4.87E-07	µg/m³	--	--	--
				Dibenz(a,h)anthracene	1.11E-08	µg/m³	(2)	--	--	--	--	1.06E-08	µg/m³	--	--	--
				Indeno(1,2,3-cd)pyrene	1.30E-07	µg/m³	(2)	--	--	--	--	1.25E-07	µg/m³	--	--	--
				Pesticides												
				Dieldrin	2.92E-09	µg/m³	(2)	--	--	--	--	2.80E-09	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	4.54E-08	µg/m³	(2)	--	--	--	--	4.35E-08	µg/m³	--	--	--
				Aroclor 1260	1.76E-05	µg/m³	(2)	--	--	--	--	1.69E-05	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.68E-11	µg/m³	(2)	--	--	--	--	1.61E-11	µg/m³	4.00E-05	µg/m³	0.0000004
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	8.74E-12	µg/m³	(2)	--	--	--	--	8.38E-12	µg/m³	4.00E-05	µg/m³	0.0000002
				Metals (Total)												
				Aluminum	6.26E-03	µg/m³	(2)	--	--	--	--	6.00E-03	µg/m³	5.00E+00	µg/m³	0.001
				Antimony	6.79E-07	µg/m³	(2)	--	--	--	--	6.51E-07	µg/m³	3.00E-01	µg/m³	0.000002
				Arsenic	8.94E-06	µg/m³	(2)	--	--	--	--	8.57E-06	µg/m³	1.50E-02	µg/m³	0.0006
				Cadmium (Diet)	2.44E-07	µg/m³	(2)	--	--	--	--	2.34E-07	µg/m³	1.00E-02	µg/m³	0.00002
				Chromium, Total	1.09E-05	µg/m³	(2)	--	--	--	--	1.05E-05	µg/m³	1.00E-01	µg/m³	0.0001
				Cobalt	7.59E-06	µg/m³	(2)	--	--	--	--	7.28E-06	µg/m³	6.00E-03	µg/m³	0.001
				Iron	1.65E-02	µg/m³	(2)	--	--	--	--	1.58E-02	µg/m³	--	--	--
				Manganese (Non-Diet)	3.09E-04	µg/m³	(2)	--	--	--	--	2.96E-04	µg/m³	5.00E-02	µg/m³	0.006
				Thallium	1.12E-07	µg/m³	(2)	--	--	--	--	1.07E-07	µg/m³	--	--	--
			Exp. Route Total								--					0.009
		Exp. Point Total									--					0.009
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	2.86E-03	µg/m³	(2)	--	--	--	--	2.74E-03	µg/m³	--	--	--
				Benzo(a)anthracene	6.75E-05	µg/m³	(2)	--	--	--	--	6.47E-05	µg/m³	--	--	--

Table A-7.4b
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	1.88E-04	µg/m³	(2)	--	--	--	--	1.80E-04	µg/m³	--	--	--
				Aroclor 1260	6.49E-02	µg/m³	(2)	--	--	--	--	6.22E-02	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	7.89E-09	µg/m³	(2)	--	--	--	--	7.56E-09	µg/m³	4.00E-05	µg/m³	0.0002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	4.11E-09	µg/m³	(2)	--	--	--	--	3.94E-09	µg/m³	4.00E-05	µg/m³	0.0001
			Exp. Route Total								--					0.0003
		Exp. Point Total									--					0.0003
	Exp. Medium Total										--					0.009
Medium Total											--					0.3
Notes:											**Total of Receptor Risks Across All Media**					**Total of Receptor Hazards Across All Media**
											--					**0.3**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.5a
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 8.8 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	(2)	--	--	--	--	1.55E-06	mg/kg-day	3.00E-04	mg/kg-day	0.005
				Benzo(a)anthracene	5.09E-01	mg/kg	(2)	--	--	--	--	6.51E-06	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	(2)	--	--	--	--	4.37E-06	mg/kg-day	3.00E-04	mg/kg-day	0.01
				Benzo(b)fluoranthene	6.90E-01	mg/kg	(2)	--	--	--	--	8.82E-06	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	(2)	--	--	--	--	1.93E-07	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	(2)	--	--	--	--	2.26E-06	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	(2)	--	--	--	--	5.08E-08	mg/kg-day	5.00E-05	mg/kg-day	0.001
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	(2)	--	--	--	--	7.89E-07	mg/kg-day	2.00E-05	mg/kg-day	0.04
				Aroclor 1260	1.18E+00	mg/kg	(2)	--	--	--	--	1.51E-05	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	(2)	--	--	--	--	2.92E-10	mg/kg-day	7.00E-10	mg/kg-day	0.4
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	(2)	--	--	--	--	1.52E-10	mg/kg-day	7.00E-10	mg/kg-day	0.2
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	(2)	--	--	--	--	1.09E-01	mg/kg-day	1.00E+00	mg/kg-day	0.1
				Antimony	9.23E-01	mg/kg	(2)	--	--	--	--	1.18E-05	mg/kg-day	4.00E-04	mg/kg-day	0.03
				Arsenic	1.22E+01	mg/kg	(2)	--	--	--	--	9.33E-05	mg/kg-day	3.00E-04	mg/kg-day	0.3
				Cadmium (Diet)	3.32E-01	mg/kg	(2)	--	--	--	--	4.24E-06	mg/kg-day	1.00E-03	mg/kg-day	0.004
				Chromium, Total	1.48E+01	mg/kg	(2)	--	--	--	--	1.90E-04	mg/kg-day	3.00E-03	mg/kg-day	0.06
				Cobalt	1.03E+01	mg/kg	(2)	--	--	--	--	1.32E-04	mg/kg-day	3.00E-04	mg/kg-day	0.4
				Iron	2.24E+04	mg/kg	(2)	--	--	--	--	2.87E-01	mg/kg-day	7.00E-01	mg/kg-day	0.4
				Manganese (Non-Diet)	4.20E+02	mg/kg	(2)	--	--	--	--	5.37E-03	mg/kg-day	2.40E-02	mg/kg-day	0.2
				Thallium	1.52E-01	mg/kg	(2)	--	--	--	--	1.94E-06	mg/kg-day	1.00E-05	mg/kg-day	0.2
			Exp. Route Total								--					2
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	(2)	--	--	--	--	3.67E-07	mg/kg-day	3.00E-04	mg/kg-day	0.001
				Benzo(a)anthracene	5.09E-01	mg/kg	(2)	--	--	--	--	2.01E-06	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	(2)	--	--	--	--	1.35E-06	mg/kg-day	3.00E-04	mg/kg-day	0.004
				Benzo(b)fluoranthene	6.90E-01	mg/kg	(2)	--	--	--	--	2.72E-06	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	(2)	--	--	--	--	5.96E-08	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	(2)	--	--	--	--	6.98E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	(2)	--	--	--	--	1.20E-08	mg/kg-day	5.00E-05	mg/kg-day	0.0002
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	(2)	--	--	--	--	2.62E-07	mg/kg-day	2.00E-05	mg/kg-day	0.01
				Aroclor 1260	1.18E+00	mg/kg	(2)	--	--	--	--	5.01E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	(2)	--	--	--	--	2.08E-11	mg/kg-day	7.00E-10	mg/kg-day	0.03
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	(2)	--	--	--	--	1.08E-11	mg/kg-day	7.00E-10	mg/kg-day	0.02

Table A-7.5a
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	(2)	--	--	--	--	2.58E-03	mg/kg-day	1.00E+00	mg/kg-day	0.003
				Antimony	9.23E-01	mg/kg	(2)	--	--	--	--	2.80E-07	mg/kg-day	6.00E-05	mg/kg-day	0.005
				Arsenic	1.22E+01	mg/kg	(2)	--	--	--	--	1.11E-05	mg/kg-day	3.00E-04	mg/kg-day	0.04
				Cadmium (Diet)	3.32E-01	mg/kg	(2)	--	--	--	--	1.01E-08	mg/kg-day	2.50E-05	mg/kg-day	0.0004
				Chromium, Total	1.48E+01	mg/kg	(2)	--	--	--	--	4.50E-06	mg/kg-day	7.50E-05	mg/kg-day	0.06
				Cobalt	1.03E+01	mg/kg	(2)	--	--	--	--	3.13E-06	mg/kg-day	3.00E-04	mg/kg-day	0.01
				Iron	2.24E+04	mg/kg	(2)	--	--	--	--	6.80E-03	mg/kg-day	7.00E-01	mg/kg-day	0.01
				Manganese (Non-Diet)	4.20E+02	mg/kg	(2)	--	--	--	--	1.27E-04	mg/kg-day	9.60E-04	mg/kg-day	0.1
				Thallium	1.52E-01	mg/kg	(2)	--	--	--	--	4.61E-08	mg/kg-day	1.00E-05	mg/kg-day	0.005
			Exp. Route Total								--					0.3
		Exp. Point Total									--					3
	Exp. Medium Total										--					3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	8.90E-08	µg/m³	(2)	--	--	--	--	8.53E-08	µg/m³	--	--	--
				Benzo(a)anthracene	3.74E-07	µg/m³	(2)	--	--	--	--	3.59E-07	µg/m³	--	--	--
				Benzo(a)pyrene	2.51E-07	µg/m³	(2)	--	--	--	--	2.41E-07	µg/m³	2.00E-03	µg/m³	0.0001
				Benzo(b)fluoranthene	5.07E-07	µg/m³	(2)	--	--	--	--	4.87E-07	µg/m³	--	--	--
				Dibenz(a,h)anthracene	1.11E-08	µg/m³	(2)	--	--	--	--	1.06E-08	µg/m³	--	--	--
				Indeno(1,2,3-cd)pyrene	1.30E-07	µg/m³	(2)	--	--	--	--	1.25E-07	µg/m³	--	--	--
				Pesticides												
				Dieldrin	2.92E-09	µg/m³	(2)	--	--	--	--	2.80E-09	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	4.54E-08	µg/m³	(2)	--	--	--	--	4.35E-08	µg/m³	--	--	--
				Aroclor 1260	8.67E-07	µg/m³	(2)	--	--	--	--	8.31E-07	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.68E-11	µg/m³	(2)	--	--	--	--	1.61E-11	µg/m³	4.00E-05	µg/m³	0.0000004
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	8.74E-12	µg/m³	(2)	--	--	--	--	8.38E-12	µg/m³	4.00E-05	µg/m³	0.0000002
				Metals (Total)												
				Aluminum	6.26E-03	µg/m³	(2)	--	--	--	--	6.00E-03	µg/m³	5.00E+00	µg/m³	0.001
				Antimony	6.79E-07	µg/m³	(2)	--	--	--	--	6.51E-07	µg/m³	3.00E-01	µg/m³	0.000002
				Arsenic	8.94E-06	µg/m³	(2)	--	--	--	--	8.57E-06	µg/m³	1.50E-02	µg/m³	0.0006
				Cadmium (Diet)	2.44E-07	µg/m³	(2)	--	--	--	--	2.34E-07	µg/m³	1.00E-02	µg/m³	0.00002
				Chromium, Total	1.09E-05	µg/m³	(2)	--	--	--	--	1.05E-05	µg/m³	1.00E-01	µg/m³	0.0001
				Cobalt	7.59E-06	µg/m³	(2)	--	--	--	--	7.28E-06	µg/m³	6.00E-03	µg/m³	0.001
				Iron	1.65E-02	µg/m³	(2)	--	--	--	--	1.58E-02	µg/m³	--	--	--
				Manganese (Non-Diet)	3.09E-04	µg/m³	(2)	--	--	--	--	2.96E-04	µg/m³	5.00E-02	µg/m³	0.006
				Thallium	1.12E-07	µg/m³	(2)	--	--	--	--	1.07E-07	µg/m³	--	--	--
			Exp. Route Total								--					0.009
		Exp. Point Total									--					0.009
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	2.86E-03	µg/m³	(2)	--	--	--	--	2.74E-03	µg/m³	--	--	--
				Benzo(a)anthracene	6.75E-05	µg/m³	(2)	--	--	--	--	6.47E-05	µg/m³	--	--	--

Table A-7.5a
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	1.88E-04	µg/m³	(2)	--	--	--	--	1.80E-04	µg/m³	--	--	--
				Aroclor 1260	3.19E-03	µg/m³	(2)	--	--	--	--	3.06E-03	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	7.89E-09	µg/m³	(2)	--	--	--	--	7.56E-09	µg/m³	4.00E-05	µg/m³	0.0002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	4.11E-09	µg/m³	(2)	--	--	--	--	3.94E-09	µg/m³	4.00E-05	µg/m³	0.0001
			Exp. Route Total								--					0.0003
		Exp. Point Total									--					0.0003
	Exp. Medium Total										--					0.009
Medium Total											--					3
Notes:											**Total of Receptor Risks Across All Media**					**3**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.5b
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 8.8 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	(2)	--	--	--	--	1.55E-06	mg/kg-day	3.00E-04	mg/kg-day	0.005
				Benzo(a)anthracene	5.09E-01	mg/kg	(2)	--	--	--	--	6.51E-06	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	(2)	--	--	--	--	4.37E-06	mg/kg-day	3.00E-04	mg/kg-day	0.01
				Benzo(b)fluoranthene	6.90E-01	mg/kg	(2)	--	--	--	--	8.82E-06	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	(2)	--	--	--	--	1.93E-07	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	(2)	--	--	--	--	2.26E-06	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	(2)	--	--	--	--	5.08E-08	mg/kg-day	5.00E-05	mg/kg-day	0.001
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	(2)	--	--	--	--	7.89E-07	mg/kg-day	2.00E-05	mg/kg-day	0.04
				Aroclor 1260	2.40E+01	mg/kg	(2)	--	--	--	--	3.07E-04	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	(2)	--	--	--	--	2.92E-10	mg/kg-day	7.00E-10	mg/kg-day	0.4
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	(2)	--	--	--	--	1.52E-10	mg/kg-day	7.00E-10	mg/kg-day	0.2
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	(2)	--	--	--	--	1.09E-01	mg/kg-day	1.00E+00	mg/kg-day	0.1
				Antimony	9.23E-01	mg/kg	(2)	--	--	--	--	1.18E-05	mg/kg-day	4.00E-04	mg/kg-day	0.03
				Arsenic	1.22E+01	mg/kg	(2)	--	--	--	--	9.33E-05	mg/kg-day	3.00E-04	mg/kg-day	0.3
				Cadmium (Diet)	3.32E-01	mg/kg	(2)	--	--	--	--	4.24E-06	mg/kg-day	1.00E-03	mg/kg-day	0.004
				Chromium, Total	1.48E+01	mg/kg	(2)	--	--	--	--	1.90E-04	mg/kg-day	3.00E-03	mg/kg-day	0.06
				Cobalt	1.03E+01	mg/kg	(2)	--	--	--	--	1.32E-04	mg/kg-day	3.00E-04	mg/kg-day	0.4
				Iron	2.24E+04	mg/kg	(2)	--	--	--	--	2.87E-01	mg/kg-day	7.00E-01	mg/kg-day	0.4
				Manganese (Non-Diet)	4.20E+02	mg/kg	(2)	--	--	--	--	5.37E-03	mg/kg-day	2.40E-02	mg/kg-day	0.2
				Thallium	1.52E-01	mg/kg	(2)	--	--	--	--	1.94E-06	mg/kg-day	1.00E-05	mg/kg-day	0.2
			Exp. Route Total								--					2
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	(2)	--	--	--	--	3.67E-07	mg/kg-day	3.00E-04	mg/kg-day	0.001
				Benzo(a)anthracene	5.09E-01	mg/kg	(2)	--	--	--	--	2.01E-06	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	(2)	--	--	--	--	1.35E-06	mg/kg-day	3.00E-04	mg/kg-day	0.004
				Benzo(b)fluoranthene	6.90E-01	mg/kg	(2)	--	--	--	--	2.72E-06	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	(2)	--	--	--	--	5.96E-08	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	(2)	--	--	--	--	6.98E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	(2)	--	--	--	--	1.20E-08	mg/kg-day	5.00E-05	mg/kg-day	0.0002
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	(2)	--	--	--	--	2.62E-07	mg/kg-day	2.00E-05	mg/kg-day	0.01
				Aroclor 1260	2.40E+01	mg/kg	(2)	--	--	--	--	1.02E-04	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	(2)	--	--	--	--	2.08E-11	mg/kg-day	7.00E-10	mg/kg-day	0.03
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	(2)	--	--	--	--	1.08E-11	mg/kg-day	7.00E-10	mg/kg-day	0.02

Table A-7.5b
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	(2)	--	--	--	--	2.58E-03	mg/kg-day	1.00E+00	mg/kg-day	0.003
				Antimony	9.23E-01	mg/kg	(2)	--	--	--	--	2.80E-07	mg/kg-day	6.00E-05	mg/kg-day	0.005
				Arsenic	1.22E+01	mg/kg	(2)	--	--	--	--	1.11E-05	mg/kg-day	3.00E-04	mg/kg-day	0.04
				Cadmium (Diet)	3.32E-01	mg/kg	(2)	--	--	--	--	1.01E-08	mg/kg-day	2.50E-05	mg/kg-day	0.0004
				Chromium, Total	1.48E+01	mg/kg	(2)	--	--	--	--	4.50E-06	mg/kg-day	7.50E-05	mg/kg-day	0.06
				Cobalt	1.03E+01	mg/kg	(2)	--	--	--	--	3.13E-06	mg/kg-day	3.00E-04	mg/kg-day	0.01
				Iron	2.24E+04	mg/kg	(2)	--	--	--	--	6.80E-03	mg/kg-day	7.00E-01	mg/kg-day	0.01
				Manganese (Non-Diet)	4.20E+02	mg/kg	(2)	--	--	--	--	1.27E-04	mg/kg-day	9.60E-04	mg/kg-day	0.1
				Thallium	1.52E-01	mg/kg	(2)	--	--	--	--	4.61E-08	mg/kg-day	1.00E-05	mg/kg-day	0.005
			Exp. Route Total								--					0.3
		Exp. Point Total									--					3
	Exp. Medium Total										--					3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	8.90E-08	µg/m³	(2)	--	--	--	--	8.53E-08	µg/m³	--	--	--
				Benzo(a)anthracene	3.74E-07	µg/m³	(2)	--	--	--	--	3.59E-07	µg/m³	--	--	--
				Benzo(a)pyrene	2.51E-07	µg/m³	(2)	--	--	--	--	2.41E-07	µg/m³	2.00E-03	µg/m³	0.0001
				Benzo(b)fluoranthene	5.07E-07	µg/m³	(2)	--	--	--	--	4.87E-07	µg/m³	--	--	--
				Dibenz(a,h)anthracene	1.11E-08	µg/m³	(2)	--	--	--	--	1.06E-08	µg/m³	--	--	--
				Indeno(1,2,3-cd)pyrene	1.30E-07	µg/m³	(2)	--	--	--	--	1.25E-07	µg/m³	--	--	--
				Pesticides												
				Dieldrin	2.92E-09	µg/m³	(2)	--	--	--	--	2.80E-09	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	4.54E-08	µg/m³	(2)	--	--	--	--	4.35E-08	µg/m³	--	--	--
				Aroclor 1260	1.76E-05	µg/m³	(2)	--	--	--	--	1.69E-05	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.68E-11	µg/m³	(2)	--	--	--	--	1.61E-11	µg/m³	4.00E-05	µg/m³	0.0000004
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	8.74E-12	µg/m³	(2)	--	--	--	--	8.38E-12	µg/m³	4.00E-05	µg/m³	0.0000002
				Metals (Total)												
				Aluminum	6.26E-03	µg/m³	(2)	--	--	--	--	6.00E-03	µg/m³	5.00E+00	µg/m³	0.001
				Antimony	6.79E-07	µg/m³	(2)	--	--	--	--	6.51E-07	µg/m³	3.00E-01	µg/m³	0.000002
				Arsenic	8.94E-06	µg/m³	(2)	--	--	--	--	8.57E-06	µg/m³	1.50E-02	µg/m³	0.0006
				Cadmium (Diet)	2.44E-07	µg/m³	(2)	--	--	--	--	2.34E-07	µg/m³	1.00E-02	µg/m³	0.00002
				Chromium, Total	1.09E-05	µg/m³	(2)	--	--	--	--	1.05E-05	µg/m³	1.00E-01	µg/m³	0.0001
				Cobalt	7.59E-06	µg/m³	(2)	--	--	--	--	7.28E-06	µg/m³	6.00E-03	µg/m³	0.001
				Iron	1.65E-02	µg/m³	(2)	--	--	--	--	1.58E-02	µg/m³	--	--	--
				Manganese (Non-Diet)	3.09E-04	µg/m³	(2)	--	--	--	--	2.96E-04	µg/m³	5.00E-02	µg/m³	0.006
				Thallium	1.12E-07	µg/m³	(2)	--	--	--	--	1.07E-07	µg/m³	--	--	--
			Exp. Route Total								--					0.009
		Exp. Point Total									--					0.009
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	2.86E-03	µg/m³	(2)	--	--	--	--	2.74E-03	µg/m³	--	--	--
				Benzo(a)anthracene	6.75E-05	µg/m³	(2)	--	--	--	--	6.47E-05	µg/m³	--	--	--

Table A-7.5b
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical 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	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk (1)	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient (1)
							Value	Units	Value	Units		Value	Units	Value	Units	
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	1.88E-04	µg/m³	(2)	--	--	--	--	1.80E-04	µg/m³	--	--	--
				Aroclor 1260	6.49E-02	µg/m³	(2)	--	--	--	--	6.22E-02	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	7.89E-09	µg/m³	(2)	--	--	--	--	7.56E-09	µg/m³	4.00E-05	µg/m³	0.0002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	4.11E-09	µg/m³	(2)	--	--	--	--	3.94E-09	µg/m³	4.00E-05	µg/m³	0.0001
			Exp. Route Total								--					0.0003
		Exp. Point Total									--					0.0003
	Exp. Medium Total										--					0.009
Medium Total											--					3
Notes:											**Total of Receptor Risks Across All Media**					**3**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.6a
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 8.8 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	1.74E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
				Benzo(a)anthracene	5.09E-01	mg/kg	3.32E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	3E-07	(2)	--	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	2.23E-06	mg/kg-day	1.00E+00	1/(mg/kg-day)	2E-06	(2)	--	--	--	--
				Benzo(b)fluoranthene	6.90E-01	mg/kg	4.51E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	5E-07	(2)	--	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	9.86E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	1E-07	(2)	--	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	1.16E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	1E-07	(2)	--	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	5.71E-09	mg/kg-day	1.60E+01	1/(mg/kg-day)	9E-08	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	8.87E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-07	(2)	--	--	--	--
				Aroclor 1260	1.18E+00	mg/kg	1.70E-06	mg/kg-day	2.00E+00	1/(mg/kg-day)	3E-06	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	3.28E-11	mg/kg-day	1.30E+05	1/(mg/kg-day)	4E-06	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	1.71E-11	mg/kg-day	1.30E+05	1/(mg/kg-day)	2E-06	(2)	--	--	--	--
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	1.22E-02	mg/kg-day	--	--	--	(2)	--	--	--	--
				Antimony	9.23E-01	mg/kg	1.33E-06	mg/kg-day	--	--	--	(2)	--	--	--	--
				Arsenic	1.22E+01	mg/kg	1.05E-05	mg/kg-day	1.50E+00	1/(mg/kg-day)	2E-05	(2)	--	--	--	--
				Cadmium (Diet)	3.32E-01	mg/kg	4.78E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
				Chromium, Total	1.48E+01	mg/kg	9.69E-05	mg/kg-day	5.00E-01	1/(mg/kg-day)	5E-05	(2)	--	--	--	--
				Cobalt	1.03E+01	mg/kg	1.48E-05	mg/kg-day	--	--	--	(2)	--	--	--	--
				Iron	2.24E+04	mg/kg	3.23E-02	mg/kg-day	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	4.20E+02	mg/kg	6.04E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Thallium	1.52E-01	mg/kg	2.19E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
			Exp. Route Total								8E-05					--
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	4.90E-08	mg/kg-day	--	--	--	(2)	--	--	--	--
				Benzo(a)anthracene	5.09E-01	mg/kg	1.11E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	1E-07	(2)	--	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	7.45E-07	mg/kg-day	1.00E+00	1/(mg/kg-day)	7E-07	(2)	--	--	--	--
				Benzo(b)fluoranthene	6.90E-01	mg/kg	1.50E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	2E-07	(2)	--	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	3.29E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	3E-08	(2)	--	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	3.86E-07	mg/kg-day	1.00E-01	1/(mg/kg-day)	4E-08	(2)	--	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	1.61E-09	mg/kg-day	1.60E+01	1/(mg/kg-day)	3E-08	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	3.50E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	7E-08	(2)	--	--	--	--
				Aroclor 1260	1.18E+00	mg/kg	6.68E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	1E-06	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	2.77E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	4E-07	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	1.44E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	2E-07	(2)	--	--	--	--

Table A-7.6a
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	3.44E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Antimony	9.23E-01	mg/kg	3.73E-08	mg/kg-day	--	--	--	(2)	--	--	--	--
				Arsenic	1.22E+01	mg/kg	1.48E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	2E-06	(2)	--	--	--	--
				Cadmium (Diet)	3.32E-01	mg/kg	1.34E-09	mg/kg-day	--	--	--	(2)	--	--	--	--
				Chromium, Total	1.48E+01	mg/kg	2.49E-06	mg/kg-day	2.00E+01	1/(mg/kg-day)	5E-05	(2)	--	--	--	--
				Cobalt	1.03E+01	mg/kg	4.18E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
				Iron	2.24E+04	mg/kg	9.07E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	4.20E+02	mg/kg	1.70E-05	mg/kg-day	--	--	--	(2)	--	--	--	--
				Thallium	1.52E-01	mg/kg	6.15E-09	mg/kg-day	--	--	--	(2)	--	--	--	--
			Exp. Route Total								6E-05					--
		Exp. Point Total									1E-04					--
	Exp. Medium Total										1E-04					--
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	8.90E-08	µg/m³	3.17E-08	µg/m³	--	--	--	(2)	--	--	--	--
				Benzo(a)anthracene	3.74E-07	µg/m³	3.69E-07	µg/m³	6.00E-05	m³/µg	2E-11	(2)	--	--	--	--
				Benzo(a)pyrene	2.51E-07	µg/m³	2.48E-07	µg/m³	6.00E-04	m³/µg	1E-10	(2)	--	--	--	--
				Benzo(b)fluoranthene	5.07E-07	µg/m³	5.00E-07	µg/m³	6.00E-05	m³/µg	3E-11	(2)	--	--	--	--
				Dibenz(a,h)anthracene	1.11E-08	µg/m³	1.10E-08	µg/m³	6.00E-04	m³/µg	7E-12	(2)	--	--	--	--
				Indeno(1,2,3-cd)pyrene	1.30E-07	µg/m³	1.28E-07	µg/m³	6.00E-05	m³/µg	8E-12	(2)	--	--	--	--
				Pesticides												
				Dieldrin	2.92E-09	µg/m³	1.04E-09	µg/m³	4.60E-03	m³/µg	5E-12	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	4.54E-08	µg/m³	1.62E-08	µg/m³	5.71E-04	m³/µg	9E-12	(2)	--	--	--	--
				Aroclor 1260	8.67E-07	µg/m³	3.09E-07	µg/m³	5.71E-04	m³/µg	2E-10	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.68E-11	µg/m³	5.98E-12	µg/m³	3.80E+01	m³/µg	2E-10	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	8.74E-12	µg/m³	3.11E-12	µg/m³	3.80E+01	m³/µg	1E-10	(2)	--	--	--	--
				Metals (Total)												
				Aluminum	6.26E-03	µg/m³	2.23E-03	µg/m³	--	--	--	(2)	--	--	--	--
				Antimony	6.79E-07	µg/m³	2.42E-07	µg/m³	--	--	--	(2)	--	--	--	--
				Arsenic	8.94E-06	µg/m³	3.18E-06	µg/m³	4.30E-03	m³/µg	1E-08	(2)	--	--	--	--
				Cadmium (Diet)	2.44E-07	µg/m³	8.69E-08	µg/m³	1.80E-03	m³/µg	2E-10	(2)	--	--	--	--
				Chromium, Total	1.09E-05	µg/m³	1.08E-05	µg/m³	8.40E-02	m³/µg	9E-07	(2)	--	--	--	--
				Cobalt	7.59E-06	µg/m³	2.70E-06	µg/m³	9.00E-03	m³/µg	2E-08	(2)	--	--	--	--
				Iron	1.65E-02	µg/m³	5.87E-03	µg/m³	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	3.09E-04	µg/m³	1.10E-04	µg/m³	--	--	--	(2)	--	--	--	--
				Thallium	1.12E-07	µg/m³	3.98E-08	µg/m³	--	--	--	(2)	--	--	--	--
			Exp. Route Total								9E-07					--
		Exp. Point Total									9E-07					--
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	2.86E-03	µg/m³	1.02E-03	µg/m³	--	--	--	(2)	--	--	--	--
				Benzo(a)anthracene	6.75E-05	µg/m³	6.66E-05	µg/m³	6.00E-05	m³/µg	4E-09	(2)	--	--	--	--

Table A-7.6a
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	1.88E-04	µg/m³	6.68E-05	µg/m³	5.71E-04	m³/µg	4E-08	(2)	--	--	--	--
				Aroclor 1260	3.19E-03	µg/m³	1.14E-03	µg/m³	5.71E-04	m³/µg	6E-07	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	7.89E-09	µg/m³	2.81E-09	µg/m³	3.80E+01	m³/µg	1E-07	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	4.11E-09	µg/m³	1.46E-09	µg/m³	3.80E+01	m³/µg	6E-08	(2)	--	--	--	--
			Exp. Route Total								9E-07					--
		Exp. Point Total									9E-07					--
	Exp. Medium Total										2E-06					--
Medium Total											1E-04					--
Notes:											**Total of Receptor Risks Across All Media**					**1E-04**
																Total of Receptor Hazards Across All Media
																--

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.6b
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 8.8 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	1.74E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
				Benzo(a)anthracene	5.09E-01	mg/kg	3.32E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	3E-07	(2)	--	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	2.23E-06	mg/kg-day	1.00E+00	1/(mg/kg-day)	2E-06	(2)	--	--	--	--
				Benzo(b)fluoranthene	6.90E-01	mg/kg	4.51E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	5E-07	(2)	--	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	9.86E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	1E-07	(2)	--	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	1.16E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	1E-07	(2)	--	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	5.71E-09	mg/kg-day	1.60E+01	1/(mg/kg-day)	9E-08	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	8.87E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-07	(2)	--	--	--	--
				Aroclor 1260	2.40E+01	mg/kg	3.45E-05	mg/kg-day	2.00E+00	1/(mg/kg-day)	7E-05	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	3.28E-11	mg/kg-day	1.30E+05	1/(mg/kg-day)	4E-06	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	1.71E-11	mg/kg-day	1.30E+05	1/(mg/kg-day)	2E-06	(2)	--	--	--	--
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	1.22E-02	mg/kg-day	--	--	--	(2)	--	--	--	--
				Antimony	9.23E-01	mg/kg	1.33E-06	mg/kg-day	--	--	--	(2)	--	--	--	--
				Arsenic	1.22E+01	mg/kg	1.05E-05	mg/kg-day	1.50E+00	1/(mg/kg-day)	2E-05	(2)	--	--	--	--
				Cadmium (Diet)	3.32E-01	mg/kg	4.78E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
				Chromium, Total	1.48E+01	mg/kg	9.69E-05	mg/kg-day	5.00E-01	1/(mg/kg-day)	5E-05	(2)	--	--	--	--
				Cobalt	1.03E+01	mg/kg	1.48E-05	mg/kg-day	--	--	--	(2)	--	--	--	--
				Iron	2.24E+04	mg/kg	3.23E-02	mg/kg-day	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	4.20E+02	mg/kg	6.04E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Thallium	1.52E-01	mg/kg	2.19E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
			Exp. Route Total								1E-04					--
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	4.90E-08	mg/kg-day	--	--	--	(2)	--	--	--	--
				Benzo(a)anthracene	5.09E-01	mg/kg	1.11E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	1E-07	(2)	--	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	7.45E-07	mg/kg-day	1.00E+00	1/(mg/kg-day)	7E-07	(2)	--	--	--	--
				Benzo(b)fluoranthene	6.90E-01	mg/kg	1.50E-06	mg/kg-day	1.00E-01	1/(mg/kg-day)	2E-07	(2)	--	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	3.29E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	3E-08	(2)	--	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	3.86E-07	mg/kg-day	1.00E-01	1/(mg/kg-day)	4E-08	(2)	--	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	1.61E-09	mg/kg-day	1.60E+01	1/(mg/kg-day)	3E-08	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	3.50E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	7E-08	(2)	--	--	--	--
				Aroclor 1260	2.40E+01	mg/kg	1.36E-05	mg/kg-day	2.00E+00	1/(mg/kg-day)	3E-05	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	2.77E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	4E-07	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	1.44E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	2E-07	(2)	--	--	--	--

Table A-7.6b
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	3.44E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Antimony	9.23E-01	mg/kg	3.73E-08	mg/kg-day	--	--	--	(2)	--	--	--	--
				Arsenic	1.22E+01	mg/kg	1.48E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	2E-06	(2)	--	--	--	--
				Cadmium (Diet)	3.32E-01	mg/kg	1.34E-09	mg/kg-day	--	--	--	(2)	--	--	--	--
				Chromium, Total	1.48E+01	mg/kg	2.49E-06	mg/kg-day	2.00E+01	1/(mg/kg-day)	5E-05	(2)	--	--	--	--
				Cobalt	1.03E+01	mg/kg	4.18E-07	mg/kg-day	--	--	--	(2)	--	--	--	--
				Iron	2.24E+04	mg/kg	9.07E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	4.20E+02	mg/kg	1.70E-05	mg/kg-day	--	--	--	(2)	--	--	--	--
				Thallium	1.52E-01	mg/kg	6.15E-09	mg/kg-day	--	--	--	(2)	--	--	--	--
			Exp. Route Total								8E-05					--
		Exp. Point Total									2E-04					--
	Exp. Medium Total										2E-04					--
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	8.90E-08	µg/m³	3.17E-08	µg/m³	--	--	--	(2)	--	--	--	--
				Benzo(a)anthracene	3.74E-07	µg/m³	3.69E-07	µg/m³	6.00E-05	m³/µg	2E-11	(2)	--	--	--	--
				Benzo(a)pyrene	2.51E-07	µg/m³	2.48E-07	µg/m³	6.00E-04	m³/µg	1E-10	(2)	--	--	--	--
				Benzo(b)fluoranthene	5.07E-07	µg/m³	5.00E-07	µg/m³	6.00E-05	m³/µg	3E-11	(2)	--	--	--	--
				Dibenz(a,h)anthracene	1.11E-08	µg/m³	1.10E-08	µg/m³	6.00E-04	m³/µg	7E-12	(2)	--	--	--	--
				Indeno(1,2,3-cd)pyrene	1.30E-07	µg/m³	1.28E-07	µg/m³	6.00E-05	m³/µg	8E-12	(2)	--	--	--	--
				Pesticides												
				Dieldrin	2.92E-09	µg/m³	1.04E-09	µg/m³	4.60E-03	m³/µg	5E-12	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	4.54E-08	µg/m³	1.62E-08	µg/m³	5.71E-04	m³/µg	9E-12	(2)	--	--	--	--
				Aroclor 1260	1.76E-05	µg/m³	6.29E-06	µg/m³	5.71E-04	m³/µg	4E-09	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.68E-11	µg/m³	5.98E-12	µg/m³	3.80E+01	m³/µg	2E-10	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	8.74E-12	µg/m³	3.11E-12	µg/m³	3.80E+01	m³/µg	1E-10	(2)	--	--	--	--
				Metals (Total)												
				Aluminum	6.26E-03	µg/m³	2.23E-03	µg/m³	--	--	--	(2)	--	--	--	--
				Antimony	6.79E-07	µg/m³	2.42E-07	µg/m³	--	--	--	(2)	--	--	--	--
				Arsenic	8.94E-06	µg/m³	3.18E-06	µg/m³	4.30E-03	m³/µg	1E-08	(2)	--	--	--	--
				Cadmium (Diet)	2.44E-07	µg/m³	8.69E-08	µg/m³	1.80E-03	m³/µg	2E-10	(2)	--	--	--	--
				Chromium, Total	1.09E-05	µg/m³	1.08E-05	µg/m³	8.40E-02	m³/µg	9E-07	(2)	--	--	--	--
				Cobalt	7.59E-06	µg/m³	2.70E-06	µg/m³	9.00E-03	m³/µg	2E-08	(2)	--	--	--	--
				Iron	1.65E-02	µg/m³	5.87E-03	µg/m³	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	3.09E-04	µg/m³	1.10E-04	µg/m³	--	--	--	(2)	--	--	--	--
				Thallium	1.12E-07	µg/m³	3.98E-08	µg/m³	--	--	--	(2)	--	--	--	--
			Exp. Route Total								9E-07					--
		Exp. Point Total									9E-07					--
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	2.86E-03	µg/m³	1.02E-03	µg/m³	--	--	--	(2)	--	--	--	--
				Benzo(a)anthracene	6.75E-05	µg/m³	6.66E-05	µg/m³	6.00E-05	m³/µg	4E-09	(2)	--	--	--	--

Table A-7.6b
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	1.88E-04	µg/m³	6.68E-05	µg/m³	5.71E-04	m³/µg	4E-08	(2)	--	--	--	--
				Aroclor 1260	6.49E-02	µg/m³	2.31E-02	µg/m³	5.71E-04	m³/µg	1E-05	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	7.89E-09	µg/m³	2.81E-09	µg/m³	3.80E+01	m³/µg	1E-07	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	4.11E-09	µg/m³	1.46E-09	µg/m³	3.80E+01	m³/µg	6E-08	(2)	--	--	--	--
			Exp. Route Total								1E-05					--
		Exp. Point Total									1E-05					--
	Exp. Medium Total										1E-05					--
Medium Total											2E-04					--
Notes:											**Total of Receptor Risks Across All Media**	**2E-04**			**Total of Receptor Hazards Across All Media**	**--**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.7
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Adult) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	0 - 0.5 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	(2)	--	--	--	--	2.03E-08	mg/kg-day	3.00E-04	mg/kg-day	0.00007
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	(2)	--	--	--	--	2.85E-07	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	(2)	--	--	--	--	5.17E-12	mg/kg-day	7.00E-10	mg/kg-day	0.007
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	(2)	--	--	--	--	3.70E-12	mg/kg-day	7.00E-10	mg/kg-day	0.005
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	(2)	--	--	--	--	1.52E-03	mg/kg-day	1.00E+00	mg/kg-day	0.002
				Arsenic	8.64E+00	mg/kg	(2)	--	--	--	--	9.23E-07	mg/kg-day	3.00E-04	mg/kg-day	0.003
				Chromium, Total	1.26E+01	mg/kg	(2)	--	--	--	--	2.24E-06	mg/kg-day	3.00E-03	mg/kg-day	0.0007
				Cobalt	1.10E+01	mg/kg	(2)	--	--	--	--	1.96E-06	mg/kg-day	3.00E-04	mg/kg-day	0.007
				Iron	2.50E+04	mg/kg	(2)	--	--	--	--	4.46E-03	mg/kg-day	7.00E-01	mg/kg-day	0.006
				Manganese (Non-Diet)	4.72E+02	mg/kg	(2)	--	--	--	--	8.41E-05	mg/kg-day	2.40E-02	mg/kg-day	0.004
				Thallium	1.44E-01	mg/kg	(2)	--	--	--	--	2.56E-08	mg/kg-day	1.00E-05	mg/kg-day	0.003
			Exp. Route Total								--					0.04
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	(2)	--	--	--	--	1.11E-08	mg/kg-day	3.00E-04	mg/kg-day	0.00004
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	(2)	--	--	--	--	1.68E-07	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	(2)	--	--	--	--	6.55E-13	mg/kg-day	7.00E-10	mg/kg-day	0.0009
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	(2)	--	--	--	--	4.69E-13	mg/kg-day	7.00E-10	mg/kg-day	0.0007
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	(2)	--	--	--	--	6.42E-05	mg/kg-day	1.00E+00	mg/kg-day	0.00006
				Arsenic	8.64E+00	mg/kg	(2)	--	--	--	--	1.95E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0006
				Chromium, Total	1.26E+01	mg/kg	(2)	--	--	--	--	9.46E-08	mg/kg-day	7.50E-05	mg/kg-day	0.001
				Cobalt	1.10E+01	mg/kg	(2)	--	--	--	--	8.29E-08	mg/kg-day	3.00E-04	mg/kg-day	0.0003
				Iron	2.50E+04	mg/kg	(2)	--	--	--	--	1.88E-04	mg/kg-day	7.00E-01	mg/kg-day	0.0003
				Manganese (Non-Diet)	4.72E+02	mg/kg	(2)	--	--	--	--	3.55E-06	mg/kg-day	9.60E-04	mg/kg-day	0.004
				Thallium	1.44E-01	mg/kg	(2)	--	--	--	--	1.08E-09	mg/kg-day	1.00E-05	mg/kg-day	0.0001
			Exp. Route Total								--					0.008
		Exp. Point Total									--					0.05
	Exp. Medium Total										--					0.05
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	8.38E-08	µg/m³	(2)	--	--	--	--	1.79E-09	µg/m³	2.00E-03	µg/m³	0.0000009
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.18E-06	µg/m³	(2)	--	--	--	--	2.51E-08	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.13E-11	µg/m³	(2)	--	--	--	--	4.56E-13	µg/m³	4.00E-05	µg/m³	0.00000001
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.53E-11	µg/m³	(2)	--	--	--	--	3.26E-13	µg/m³	4.00E-05	µg/m³	8E-09

Table A-7.7
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Adult) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	6.28E-03	µg/m³	(2)	--	--	--	--	1.34E-04	µg/m³	5.00E+00	µg/m³	0.00003
				Arsenic	6.35E-06	µg/m³	(2)	--	--	--	--	1.36E-07	µg/m³	1.50E-02	µg/m³	0.000009
				Chromium, Total	9.25E-06	µg/m³	(2)	--	--	--	--	1.98E-07	µg/m³	1.00E-01	µg/m³	0.000002
				Cobalt	8.10E-06	µg/m³	(2)	--	--	--	--	1.73E-07	µg/m³	6.00E-03	µg/m³	0.00003
				Iron	1.84E-02	µg/m³	(2)	--	--	--	--	3.93E-04	µg/m³	--	--	--
				Manganese (Non-Diet)	3.47E-04	µg/m³	(2)	--	--	--	--	7.42E-06	µg/m³	5.00E-02	µg/m³	0.0001
				Thallium	1.06E-07	µg/m³	(2)	--	--	--	--	2.26E-09	µg/m³	--	--	--
			Exp. Route Total								--					0.0002
		Exp. Point Total									--					0.0002
		Vapors above Site	Inhalation													
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	4.33E-03	µg/m³	(2)	--	--	--	--	9.25E-05	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.00E-08	µg/m³	(2)	--	--	--	--	2.14E-10	µg/m³	4.00E-05	µg/m³	0.000005
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	7.18E-09	µg/m³	(2)	--	--	--	--	1.53E-10	µg/m³	4.00E-05	µg/m³	0.000004
			Exp. Route Total								--					0.000009
		Exp. Point Total									--					0.000009
	Exp. Medium Total										--					0.0002
Medium Total											--					0.05
Notes:											**--**					**0.05**

Total of Receptor Risks Across All Media — **Total of Receptor Hazards Across All Media**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.8
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Child) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	0 - 0.5 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	(2)	--	--	--	--	2.17E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0007
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	(2)	--	--	--	--	3.04E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	(2)	--	--	--	--	5.51E-11	mg/kg-day	7.00E-10	mg/kg-day	0.08
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	(2)	--	--	--	--	3.95E-11	mg/kg-day	7.00E-10	mg/kg-day	0.06
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	(2)	--	--	--	--	1.62E-02	mg/kg-day	1.00E+00	mg/kg-day	0.02
				Arsenic	8.64E+00	mg/kg	(2)	--	--	--	--	9.85E-06	mg/kg-day	3.00E-04	mg/kg-day	0.03
				Chromium, Total	1.26E+01	mg/kg	(2)	--	--	--	--	2.39E-05	mg/kg-day	3.00E-03	mg/kg-day	0.008
				Cobalt	1.10E+01	mg/kg	(2)	--	--	--	--	2.09E-05	mg/kg-day	3.00E-04	mg/kg-day	0.07
				Iron	2.50E+04	mg/kg	(2)	--	--	--	--	4.75E-02	mg/kg-day	7.00E-01	mg/kg-day	0.07
				Manganese (Non-Diet)	4.72E+02	mg/kg	(2)	--	--	--	--	8.97E-04	mg/kg-day	2.40E-02	mg/kg-day	0.04
				Thallium	1.44E-01	mg/kg	(2)	--	--	--	--	2.74E-07	mg/kg-day	1.00E-05	mg/kg-day	0.03
			Exp. Route Total								--					0.4
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	(2)	--	--	--	--	6.68E-08	mg/kg-day	3.00E-04	mg/kg-day	0.0002
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	(2)	--	--	--	--	1.01E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	(2)	--	--	--	--	3.93E-12	mg/kg-day	7.00E-10	mg/kg-day	0.006
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	(2)	--	--	--	--	2.81E-12	mg/kg-day	7.00E-10	mg/kg-day	0.004
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	(2)	--	--	--	--	3.85E-04	mg/kg-day	1.00E+00	mg/kg-day	0.0004
				Arsenic	8.64E+00	mg/kg	(2)	--	--	--	--	1.17E-06	mg/kg-day	3.00E-04	mg/kg-day	0.004
				Chromium, Total	1.26E+01	mg/kg	(2)	--	--	--	--	5.67E-07	mg/kg-day	7.50E-05	mg/kg-day	0.008
				Cobalt	1.10E+01	mg/kg	(2)	--	--	--	--	4.97E-07	mg/kg-day	3.00E-04	mg/kg-day	0.002
				Iron	2.50E+04	mg/kg	(2)	--	--	--	--	1.13E-03	mg/kg-day	7.00E-01	mg/kg-day	0.002
				Manganese (Non-Diet)	4.72E+02	mg/kg	(2)	--	--	--	--	2.13E-05	mg/kg-day	9.60E-04	mg/kg-day	0.02
				Thallium	1.44E-01	mg/kg	(2)	--	--	--	--	6.49E-09	mg/kg-day	1.00E-05	mg/kg-day	0.0006
			Exp. Route Total								--					0.05
		Exp. Point Total									--					0.4
	Exp. Medium Total										--					0.4
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	8.38E-08	µg/m³	(2)	--	--	--	--	1.79E-09	µg/m³	2.00E-03	µg/m³	0.0000009
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.18E-06	µg/m³	(2)	--	--	--	--	2.51E-08	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.13E-11	µg/m³	(2)	--	--	--	--	4.56E-13	µg/m³	4.00E-05	µg/m³	0.00000001
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.53E-11	µg/m³	(2)	--	--	--	--	3.26E-13	µg/m³	4.00E-05	µg/m³	8E-09

Table A-7.8
Calculation of Chemical Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Child) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	6.28E-03	µg/m³	(2)	--	--	--	--	1.34E-04	µg/m³	5.00E+00	µg/m³	0.00003
				Arsenic	6.35E-06	µg/m³	(2)	--	--	--	--	1.36E-07	µg/m³	1.50E-02	µg/m³	0.000009
				Chromium, Total	9.25E-06	µg/m³	(2)	--	--	--	--	1.98E-07	µg/m³	1.00E-01	µg/m³	0.000002
				Cobalt	8.10E-06	µg/m³	(2)	--	--	--	--	1.73E-07	µg/m³	6.00E-03	µg/m³	0.00003
				Iron	1.84E-02	µg/m³	(2)	--	--	--	--	3.93E-04	µg/m³	--	--	--
				Manganese (Non-Diet)	3.47E-04	µg/m³	(2)	--	--	--	--	7.42E-06	µg/m³	5.00E-02	µg/m³	0.0001
				Thallium	1.06E-07	µg/m³	(2)	--	--	--	--	2.26E-09	µg/m³	--	--	--
			Exp. Route Total								--					0.0002
		Exp. Point Total									--					0.0002
		Vapors above Site	Inhalation													
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	4.33E-03	µg/m³	(2)	--	--	--	--	9.25E-05	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.00E-08	µg/m³	(2)	--	--	--	--	2.14E-10	µg/m³	4.00E-05	µg/m³	0.000005
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	7.18E-09	µg/m³	(2)	--	--	--	--	1.53E-10	µg/m³	4.00E-05	µg/m³	0.000004
			Exp. Route Total								--					0.000009
		Exp. Point Total									--					0.000009
	Exp. Medium Total										--					0.0002
Medium Total											--					0.4
Notes:											**--**					**0.4**

Total of Receptor Risks Across All Media — **Total of Receptor Hazards Across All Media**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.9
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Lifetime) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Recreator
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	0 - 0.5 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	1.11E-07	mg/kg-day	1.00E+00	1/(mg/kg-day)	1E-07	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	3.42E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	7E-07	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	6.20E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	8E-07	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	4.44E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	6E-07	(2)	--	--	--	--
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	1.83E-03	mg/kg-day	--	--	--	(2)	--	--	--	--
				Arsenic	8.64E+00	mg/kg	1.11E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	2E-06	(2)	--	--	--	--
				Chromium, Total	1.26E+01	mg/kg	1.22E-05	mg/kg-day	5.00E-01	1/(mg/kg-day)	6E-06	(2)	--	--	--	--
				Cobalt	1.10E+01	mg/kg	2.35E-06	mg/kg-day	--	--	--	(2)	--	--	--	--
				Iron	2.50E+04	mg/kg	5.35E-03	mg/kg-day	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	4.72E+02	mg/kg	1.01E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Thallium	1.44E-01	mg/kg	3.08E-08	mg/kg-day	--	--	--	(2)	--	--	--	--
			Exp. Route Total								1E-05					--
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	3.69E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	4E-08	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	1.35E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	3E-07	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	5.23E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	7E-08	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	3.75E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	5E-08	(2)	--	--	--	--
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	5.13E-05	mg/kg-day	--	--	--	(2)	--	--	--	--
				Arsenic	8.64E+00	mg/kg	1.56E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	2E-07	(2)	--	--	--	--
				Chromium, Total	1.26E+01	mg/kg	3.13E-07	mg/kg-day	2.00E+01	1/(mg/kg-day)	6E-06	(2)	--	--	--	--
				Cobalt	1.10E+01	mg/kg	6.63E-08	mg/kg-day	--	--	--	(2)	--	--	--	--
				Iron	2.50E+04	mg/kg	1.50E-04	mg/kg-day	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	4.72E+02	mg/kg	2.84E-06	mg/kg-day	--	--	--	(2)	--	--	--	--
				Thallium	1.44E-01	mg/kg	8.66E-10	mg/kg-day	--	--	--	(2)	--	--	--	--
			Exp. Route Total								7E-06					--
		Exp. Point Total									2E-05					--
	Exp. Medium Total										2E-05					--
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	8.38E-08	µg/m³	1.84E-09	µg/m³	6.00E-04	m³/µg	1E-12	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.18E-06	µg/m³	9.34E-09	µg/m³	5.71E-04	m³/µg	5E-12	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.13E-11	µg/m³	1.69E-13	µg/m³	3.80E+01	m³/µg	6E-12	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.53E-11	µg/m³	1.21E-13	µg/m³	3.80E+01	m³/µg	5E-12	(2)	--	--	--	--

Table A-7.9
Calculation of Chemical Cancer Risks
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Lifetime) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Recreator
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	6.28E-03	µg/m³	4.98E-05	µg/m³	--	--	--	(2)	--	--	--	--
				Arsenic	6.35E-06	µg/m³	5.04E-08	µg/m³	4.30E-03	m³/µg	2E-10	(2)	--	--	--	--
				Chromium, Total	9.25E-06	µg/m³	2.03E-07	µg/m³	8.40E-02	m³/µg	2E-08	(2)	--	--	--	--
				Cobalt	8.10E-06	µg/m³	6.43E-08	µg/m³	9.00E-03	m³/µg	6E-10	(2)	--	--	--	--
				Iron	1.84E-02	µg/m³	1.46E-04	µg/m³	--	--	--	(2)	--	--	--	--
				Manganese (Non-Diet)	3.47E-04	µg/m³	2.76E-06	µg/m³	--	--	--	(2)	--	--	--	--
				Thallium	1.06E-07	µg/m³	8.40E-10	µg/m³	--	--	--	(2)	--	--	--	--
			Exp. Route Total								2E-08					--
		Exp. Point Total									2E-08					--
		Vapors above Site	Inhalation													
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	4.33E-03	µg/m³	3.43E-05	µg/m³	5.71E-04	m³/µg	2E-08	(2)	--	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.00E-08	µg/m³	7.96E-11	µg/m³	3.80E+01	m³/µg	3E-09	(2)	--	--	--	--
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	7.18E-09	µg/m³	5.70E-11	µg/m³	3.80E+01	m³/µg	2E-09	(2)	--	--	--	--
			Exp. Route Total								2E-08					--
		Exp. Point Total									2E-08					--
	Exp. Medium Total										4E-08					--
Medium Total											2E-05					--
Notes:											**Total of Receptor Risks Across All Media**					**Total of Receptor Hazards Across All Media**
											2E-05					**--**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table A-7.10
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Trespasser (Adolescent) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Trespasser
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	0 - 0.5 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	2.29E-09	mg/kg-day	1.00E+00	1/(mg/kg-day)	2E-09	5.34E-09	mg/kg-day	3.00E-04	mg/kg-day	0.00002
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	1.07E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-08	7.49E-08	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	1.94E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	3E-08	1.36E-12	mg/kg-day	7.00E-10	mg/kg-day	0.002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	1.39E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	2E-08	9.73E-13	mg/kg-day	7.00E-10	mg/kg-day	0.001
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	5.71E-05	mg/kg-day	--	--	--	4.00E-04	mg/kg-day	1.00E+00	mg/kg-day	0.0004
				Arsenic	8.64E+00	mg/kg	3.47E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	5E-08	2.43E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0008
				Chromium, Total	1.26E+01	mg/kg	2.53E-07	mg/kg-day	5.00E-01	1/(mg/kg-day)	1E-07	5.89E-07	mg/kg-day	3.00E-03	mg/kg-day	0.0002
				Cobalt	1.10E+01	mg/kg	7.37E-08	mg/kg-day	--	--	--	5.16E-07	mg/kg-day	3.00E-04	mg/kg-day	0.002
				Iron	2.50E+04	mg/kg	1.67E-04	mg/kg-day	--	--	--	1.17E-03	mg/kg-day	7.00E-01	mg/kg-day	0.002
				Manganese (Non-Diet)	4.72E+02	mg/kg	3.16E-06	mg/kg-day	--	--	--	2.21E-05	mg/kg-day	2.40E-02	mg/kg-day	0.0009
				Thallium	1.44E-01	mg/kg	9.63E-10	mg/kg-day	--	--	--	6.74E-09	mg/kg-day	1.00E-05	mg/kg-day	0.0007
			Exp. Route Total								2E-07					0.01
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	1.14E-01	mg/kg	2.04E-09	mg/kg-day	1.00E+00	1/(mg/kg-day)	2E-09	4.75E-09	mg/kg-day	3.00E-04	mg/kg-day	0.00002
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.60E+00	mg/kg	1.03E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-08	7.18E-08	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.90E-05	mg/kg	3.99E-14	mg/kg-day	1.30E+05	1/(mg/kg-day)	5E-09	2.79E-13	mg/kg-day	7.00E-10	mg/kg-day	0.0004
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	2.08E-05	mg/kg	2.85E-14	mg/kg-day	1.30E+05	1/(mg/kg-day)	4E-09	2.00E-13	mg/kg-day	7.00E-10	mg/kg-day	0.0003
				Metals (Total)												
				Aluminum	8.54E+03	mg/kg	3.91E-06	mg/kg-day	--	--	--	2.74E-05	mg/kg-day	1.00E+00	mg/kg-day	0.00003
				Arsenic	8.64E+00	mg/kg	1.19E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	2E-08	8.31E-08	mg/kg-day	3.00E-04	mg/kg-day	0.0003
				Chromium, Total	1.26E+01	mg/kg	1.73E-08	mg/kg-day	2.00E+01	1/(mg/kg-day)	3E-07	4.03E-08	mg/kg-day	7.50E-05	mg/kg-day	0.0005
				Cobalt	1.10E+01	mg/kg	5.05E-09	mg/kg-day	--	--	--	3.53E-08	mg/kg-day	3.00E-04	mg/kg-day	0.0001
				Iron	2.50E+04	mg/kg	1.15E-05	mg/kg-day	--	--	--	8.03E-05	mg/kg-day	7.00E-01	mg/kg-day	0.0001
				Manganese (Non-Diet)	4.72E+02	mg/kg	2.16E-07	mg/kg-day	--	--	--	1.51E-06	mg/kg-day	9.60E-04	mg/kg-day	0.002
				Thallium	1.44E-01	mg/kg	6.60E-11	mg/kg-day	--	--	--	4.62E-10	mg/kg-day	1.00E-05	mg/kg-day	0.00005
			Exp. Route Total								4E-07					0.003
		Exp. Point Total									6E-07					0.01
	Exp. Medium Total										6E-07					0.01
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)pyrene	8.38E-08	µg/m³	2.36E-10	µg/m³	6.00E-04	m³/µg	1E-13	5.51E-10	µg/m³	2.00E-03	µg/m³	0.0000003
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	1.18E-06	µg/m³	1.11E-09	µg/m³	5.71E-04	m³/µg	6E-13	7.74E-09	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.13E-11	µg/m³	2.00E-14	µg/m³	3.80E+01	m³/µg	8E-13	1.40E-13	µg/m³	4.00E-05	µg/m³	4E-09
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.53E-11	µg/m³	1.43E-14	µg/m³	3.80E+01	m³/µg	5E-13	1.00E-13	µg/m³	4.00E-05	µg/m³	3E-09

Table A-7.10
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Trespasser (Adolescent) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Trespasser
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	6.28E-03	µg/m³	5.90E-06	µg/m³	--	--	--	4.13E-05	µg/m³	5.00E+00	µg/m³	0.000008
				Arsenic	6.35E-06	µg/m³	5.97E-09	µg/m³	4.30E-03	m³/µg	3E-11	4.18E-08	µg/m³	1.50E-02	µg/m³	0.000003
				Chromium, Total	9.25E-06	µg/m³	2.61E-08	µg/m³	8.40E-02	m³/µg	2E-09	6.08E-08	µg/m³	1.00E-01	µg/m³	0.0000006
				Cobalt	8.10E-06	µg/m³	7.61E-09	µg/m³	9.00E-03	m³/µg	7E-11	5.33E-08	µg/m³	6.00E-03	µg/m³	0.000009
				Iron	1.84E-02	µg/m³	1.73E-05	µg/m³	--	--	--	1.21E-04	µg/m³	--	--	--
				Manganese (Non-Diet)	3.47E-04	µg/m³	3.26E-07	µg/m³	--	--	--	2.28E-06	µg/m³	5.00E-02	µg/m³	0.00005
				Thallium	1.06E-07	µg/m³	9.95E-11	µg/m³	--	--	--	6.96E-10	µg/m³	--	--	--
			Exp. Route Total								2E-09					0.00007
		Exp. Point Total									2E-09					0.00007
		Vapors above Site	Inhalation													
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1260	6.98E-03	µg/m³	6.55E-06	µg/m³	5.71E-04	m³/µg	4E-09	4.59E-05	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.62E-08	µg/m³	1.52E-11	µg/m³	3.80E+01	m³/µg	6E-10	1.06E-10	µg/m³	4.00E-05	µg/m³	0.000003
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.16E-08	µg/m³	1.09E-11	µg/m³	3.80E+01	m³/µg	4E-10	7.61E-11	µg/m³	4.00E-05	µg/m³	0.000002
			Exp. Route Total								5E-09					0.000005
		Exp. Point Total									5E-09					0.000005
	Exp. Medium Total										7E-09					0.00007
Medium Total											6E-07					0.01
Notes:											**6E-07**					**0.01**

Total of Receptor Risks Across All Media | **Total of Receptor Hazards Across All Media**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table A-7.11a
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Commercial/Industrial Worker - Total Soil (0 - 2 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Commercial/Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 2 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)anthracene	3.29E-01	mg/kg	1.01E-07	mg/kg-day	1.00E-01	1/(mg/kg-day)	1E-08	2.82E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	2.95E-01	mg/kg	9.02E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	9E-08	2.53E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0008
				Benzo(b)fluoranthene	5.31E-01	mg/kg	1.62E-07	mg/kg-day	1.00E-01	1/(mg/kg-day)	2E-08	4.55E-07	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.61E-01	mg/kg	4.92E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	5E-09	1.38E-07	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	5.51E-01	mg/kg	1.68E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	3E-07	4.72E-07	mg/kg-day	2.00E-05	mg/kg-day	0.02
				Aroclor 1260	1.58E+00	mg/kg	4.84E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	1E-06	1.35E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.15E-05	mg/kg	6.57E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	9E-07	1.84E-11	mg/kg-day	7.00E-10	mg/kg-day	0.03
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.36E-05	mg/kg	4.17E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	5E-07	1.17E-11	mg/kg-day	7.00E-10	mg/kg-day	0.02
				Metals (Total)												
				Aluminum	8.70E+03	mg/kg	2.66E-03	mg/kg-day	--	--	--	7.45E-03	mg/kg-day	1.00E+00	mg/kg-day	0.007
				Antimony	1.04E+00	mg/kg	3.17E-07	mg/kg-day	--	--	--	8.87E-07	mg/kg-day	4.00E-04	mg/kg-day	0.002
				Arsenic	1.30E+01	mg/kg	2.38E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	4E-06	6.67E-06	mg/kg-day	3.00E-04	mg/kg-day	0.02
				Cadmium (Diet)	5.21E-01	mg/kg	1.59E-07	mg/kg-day	--	--	--	4.46E-07	mg/kg-day	1.00E-03	mg/kg-day	0.0004
				Chromium, Total	1.58E+01	mg/kg	4.82E-06	mg/kg-day	5.00E-01	1/(mg/kg-day)	2E-06	1.35E-05	mg/kg-day	3.00E-03	mg/kg-day	0.004
				Cobalt	1.12E+01	mg/kg	3.41E-06	mg/kg-day	--	--	--	9.55E-06	mg/kg-day	3.00E-04	mg/kg-day	0.03
				Iron	2.45E+04	mg/kg	7.50E-03	mg/kg-day	--	--	--	2.10E-02	mg/kg-day	7.00E-01	mg/kg-day	0.03
				Manganese (Non-Diet)	4.92E+02	mg/kg	1.51E-04	mg/kg-day	--	--	--	4.21E-04	mg/kg-day	2.40E-02	mg/kg-day	0.02
				Thallium	1.64E-01	mg/kg	5.01E-08	mg/kg-day	--	--	--	1.40E-07	mg/kg-day	1.00E-05	mg/kg-day	0.01
			Exp. Route Total								9E-06					0.2
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)anthracene	3.29E-01	mg/kg	5.54E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	6E-09	1.55E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	2.95E-01	mg/kg	4.96E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	5E-08	1.39E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0005
				Benzo(b)fluoranthene	5.31E-01	mg/kg	8.93E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	9E-09	2.50E-07	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.61E-01	mg/kg	2.71E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	3E-09	7.58E-08	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	5.51E-01	mg/kg	9.98E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-07	2.80E-07	mg/kg-day	2.00E-05	mg/kg-day	0.01
				Aroclor 1260	1.58E+00	mg/kg	2.87E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	6E-07	8.03E-07	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.15E-05	mg/kg	8.34E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	1E-07	2.34E-12	mg/kg-day	7.00E-10	mg/kg-day	0.003
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.36E-05	mg/kg	5.30E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	7E-08	1.48E-12	mg/kg-day	7.00E-10	mg/kg-day	0.002
				Metals (Total)												
				Aluminum	8.70E+03	mg/kg	1.13E-04	mg/kg-day	--	--	--	3.15E-04	mg/kg-day	1.00E+00	mg/kg-day	0.0003
				Antimony	1.04E+00	mg/kg	1.34E-08	mg/kg-day	--	--	--	3.75E-08	mg/kg-day	6.00E-05	mg/kg-day	0.0006
				Arsenic	1.30E+01	mg/kg	5.04E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	8E-07	1.41E-06	mg/kg-day	3.00E-04	mg/kg-day	0.005
				Cadmium (Diet)	5.21E-01	mg/kg	6.74E-10	mg/kg-day	--	--	--	1.89E-09	mg/kg-day	2.50E-05	mg/kg-day	0.00008
				Chromium, Total	1.58E+01	mg/kg	2.04E-07	mg/kg-day	2.00E+01	1/(mg/kg-day)	4E-06	5.71E-07	mg/kg-day	7.50E-05	mg/kg-day	0.008
				Cobalt	1.12E+01	mg/kg	1.44E-07	mg/kg-day	--	--	--	4.04E-07	mg/kg-day	3.00E-04	mg/kg-day	0.001
				Iron	2.45E+04	mg/kg	3.17E-04	mg/kg-day	--	--	--	8.89E-04	mg/kg-day	7.00E-01	mg/kg-day	0.001
				Manganese (Non-Diet)	4.92E+02	mg/kg	6.37E-06	mg/kg-day	--	--	--	1.78E-05	mg/kg-day	9.60E-04	mg/kg-day	0.02
				Thallium	1.64E-01	mg/kg	2.12E-09	mg/kg-day	--	--	--	5.94E-09	mg/kg-day	1.00E-05	mg/kg-day	0.0006
			Exp. Route Total								6E-06					0.06
		Exp. Point Total									1E-05					0.3

Table A-7.11a
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Commercial/Industrial Worker - Total Soil (0 - 2 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Commercial/Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
	Exp. Medium Total										1E-05					0.3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)anthracene	2.42E-07	µg/m³	1.97E-08	µg/m³	6.00E-05	m³/µg	1E-12	5.52E-08	µg/m³	--	--	--
				Benzo(a)pyrene	2.17E-07	µg/m³	1.77E-08	µg/m³	6.00E-04	m³/µg	1E-11	4.95E-08	µg/m³	2.00E-03	µg/m³	0.00002
				Benzo(b)fluoranthene	3.90E-07	µg/m³	3.18E-08	µg/m³	6.00E-05	m³/µg	2E-12	8.91E-08	µg/m³	--	--	--
				Indeno(1,2,3-cd)pyrene	1.18E-07	µg/m³	9.65E-09	µg/m³	6.00E-05	m³/µg	6E-13	2.70E-08	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	4.05E-07	µg/m³	3.30E-08	µg/m³	5.71E-04	m³/µg	2E-11	9.25E-08	µg/m³	--	--	--
				Aroclor 1260	1.16E-06	µg/m³	9.48E-08	µg/m³	5.71E-04	m³/µg	5E-11	2.66E-07	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.58E-11	µg/m³	1.29E-12	µg/m³	3.80E+01	m³/µg	5E-11	3.61E-12	µg/m³	4.00E-05	µg/m³	0.00000009
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.00E-11	µg/m³	8.18E-13	µg/m³	3.80E+01	m³/µg	3E-11	2.29E-12	µg/m³	4.00E-05	µg/m³	0.00000006
				Metals (Total)												
				Aluminum	6.40E-03	µg/m³	5.22E-04	µg/m³	--	--	--	1.46E-03	µg/m³	5.00E+00	µg/m³	0.0003
				Antimony	7.62E-07	µg/m³	6.21E-08	µg/m³	--	--	--	1.74E-07	µg/m³	3.00E-01	µg/m³	0.0000006
				Arsenic	9.54E-06	µg/m³	7.78E-07	µg/m³	4.30E-03	m³/µg	3E-09	2.18E-06	µg/m³	1.50E-02	µg/m³	0.0001
				Cadmium (Diet)	3.83E-07	µg/m³	3.12E-08	µg/m³	1.80E-03	m³/µg	6E-11	8.75E-08	µg/m³	1.00E-02	µg/m³	0.000009
				Chromium, Total	1.16E-05	µg/m³	9.45E-07	µg/m³	8.40E-02	m³/µg	8E-08	2.65E-06	µg/m³	1.00E-01	µg/m³	0.00003
				Cobalt	8.20E-06	µg/m³	6.69E-07	µg/m³	9.00E-03	m³/µg	6E-09	1.87E-06	µg/m³	6.00E-03	µg/m³	0.0003
				Iron	1.80E-02	µg/m³	1.47E-03	µg/m³	--	--	--	4.12E-03	µg/m³	--	--	--
				Manganese (Non-Diet)	3.62E-04	µg/m³	2.95E-05	µg/m³	--	--	--	8.26E-05	µg/m³	5.00E-02	µg/m³	0.002
				Thallium	1.21E-07	µg/m³	9.83E-09	µg/m³	--	--	--	2.75E-08	µg/m³	--	--	--
			Exp. Route Total								9E-08					0.002
		Exp. Point Total									9E-08					0.002
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)anthracene	4.45E-05	µg/m³	3.63E-06	µg/m³	6.00E-05	m³/µg	2E-10	1.02E-05	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	1.71E-03	µg/m³	1.39E-04	µg/m³	5.71E-04	m³/µg	8E-08	3.90E-04	µg/m³	--	--	--
				Aroclor 1260	4.36E-03	µg/m³	3.56E-04	µg/m³	5.71E-04	m³/µg	2E-07	9.96E-04	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	7.57E-09	µg/m³	6.18E-10	µg/m³	3.80E+01	m³/µg	2E-08	1.73E-09	µg/m³	4.00E-05	µg/m³	0.00004
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	4.81E-09	µg/m³	3.92E-10	µg/m³	3.80E+01	m³/µg	1E-08	1.10E-09	µg/m³	4.00E-05	µg/m³	0.00003
			Exp. Route Total								3E-07					0.00007
		Exp. Point Total									3E-07					0.00007
	Exp. Medium Total										4E-07					0.003
Medium Total											2E-05					0.3
Notes:											**Total of Receptor Risks Across All Media**					**0.3**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table A-7.11b
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Commercial/Industrial Worker - Total Soil (0 - 2 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Commercial/Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 2 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)anthracene	3.29E-01	mg/kg	1.01E-07	mg/kg-day	1.00E-01	1/(mg/kg-day)	1E-08	2.82E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	2.95E-01	mg/kg	9.02E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	9E-08	2.53E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0008
				Benzo(b)fluoranthene	5.31E-01	mg/kg	1.62E-07	mg/kg-day	1.00E-01	1/(mg/kg-day)	2E-08	4.55E-07	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.61E-01	mg/kg	4.92E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	5E-09	1.38E-07	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	5.51E-01	mg/kg	1.68E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	3E-07	4.72E-07	mg/kg-day	2.00E-05	mg/kg-day	0.02
				Aroclor 1260	2.40E+01	mg/kg	7.34E-06	mg/kg-day	2.00E+00	1/(mg/kg-day)	1E-05	2.05E-05	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.15E-05	mg/kg	6.57E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	9E-07	1.84E-11	mg/kg-day	7.00E-10	mg/kg-day	0.03
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.36E-05	mg/kg	4.17E-12	mg/kg-day	1.30E+05	1/(mg/kg-day)	5E-07	1.17E-11	mg/kg-day	7.00E-10	mg/kg-day	0.02
				Metals (Total)												
				Aluminum	8.70E+03	mg/kg	2.66E-03	mg/kg-day	--	--	--	7.45E-03	mg/kg-day	1.00E+00	mg/kg-day	0.007
				Antimony	1.04E+00	mg/kg	3.17E-07	mg/kg-day	--	--	--	8.87E-07	mg/kg-day	4.00E-04	mg/kg-day	0.002
				Arsenic	1.30E+01	mg/kg	2.38E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	4E-06	6.67E-06	mg/kg-day	3.00E-04	mg/kg-day	0.02
				Cadmium (Diet)	5.21E-01	mg/kg	1.59E-07	mg/kg-day	--	--	--	4.46E-07	mg/kg-day	1.00E-03	mg/kg-day	0.0004
				Chromium, Total	1.58E+01	mg/kg	4.82E-06	mg/kg-day	5.00E-01	1/(mg/kg-day)	2E-06	1.35E-05	mg/kg-day	3.00E-03	mg/kg-day	0.004
				Cobalt	1.12E+01	mg/kg	3.41E-06	mg/kg-day	--	--	--	9.55E-06	mg/kg-day	3.00E-04	mg/kg-day	0.03
				Iron	2.45E+04	mg/kg	7.50E-03	mg/kg-day	--	--	--	2.10E-02	mg/kg-day	7.00E-01	mg/kg-day	0.03
				Manganese (Non-Diet)	4.92E+02	mg/kg	1.51E-04	mg/kg-day	--	--	--	4.21E-04	mg/kg-day	2.40E-02	mg/kg-day	0.02
				Thallium	1.64E-01	mg/kg	5.01E-08	mg/kg-day	--	--	--	1.40E-07	mg/kg-day	1.00E-05	mg/kg-day	0.01
			Exp. Route Total								2E-05					0.2
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)anthracene	3.29E-01	mg/kg	5.54E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	6E-09	1.55E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	2.95E-01	mg/kg	4.96E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	5E-08	1.39E-07	mg/kg-day	3.00E-04	mg/kg-day	0.0005
				Benzo(b)fluoranthene	5.31E-01	mg/kg	8.93E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	9E-09	2.50E-07	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.61E-01	mg/kg	2.71E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	3E-09	7.58E-08	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	5.51E-01	mg/kg	9.98E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-07	2.80E-07	mg/kg-day	2.00E-05	mg/kg-day	0.01
				Aroclor 1260	2.40E+01	mg/kg	4.35E-06	mg/kg-day	2.00E+00	1/(mg/kg-day)	9E-06	1.22E-05	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.15E-05	mg/kg	8.34E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	1E-07	2.34E-12	mg/kg-day	7.00E-10	mg/kg-day	0.003
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.36E-05	mg/kg	5.30E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	7E-08	1.48E-12	mg/kg-day	7.00E-10	mg/kg-day	0.002
				Metals (Total)												
				Aluminum	8.70E+03	mg/kg	1.13E-04	mg/kg-day	--	--	--	3.15E-04	mg/kg-day	1.00E+00	mg/kg-day	0.0003
				Antimony	1.04E+00	mg/kg	1.34E-08	mg/kg-day	--	--	--	3.75E-08	mg/kg-day	6.00E-05	mg/kg-day	0.0006
				Arsenic	1.30E+01	mg/kg	5.04E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	8E-07	1.41E-06	mg/kg-day	3.00E-04	mg/kg-day	0.005
				Cadmium (Diet)	5.21E-01	mg/kg	6.74E-10	mg/kg-day	--	--	--	1.89E-09	mg/kg-day	2.50E-05	mg/kg-day	0.00008
				Chromium, Total	1.58E+01	mg/kg	2.04E-07	mg/kg-day	2.00E+01	1/(mg/kg-day)	4E-06	5.71E-07	mg/kg-day	7.50E-05	mg/kg-day	0.008
				Cobalt	1.12E+01	mg/kg	1.44E-07	mg/kg-day	--	--	--	4.04E-07	mg/kg-day	3.00E-04	mg/kg-day	0.001
				Iron	2.45E+04	mg/kg	3.17E-04	mg/kg-day	--	--	--	8.89E-04	mg/kg-day	7.00E-01	mg/kg-day	0.001
				Manganese (Non-Diet)	4.92E+02	mg/kg	6.37E-06	mg/kg-day	--	--	--	1.78E-05	mg/kg-day	9.60E-04	mg/kg-day	0.02
				Thallium	1.64E-01	mg/kg	2.12E-09	mg/kg-day	--	--	--	5.94E-09	mg/kg-day	1.00E-05	mg/kg-day	0.0006
			Exp. Route Total								1E-05					0.06
		Exp. Point Total									4E-05					0.3

Table A-7.11b
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Commercial/Industrial Worker - Total Soil (0 - 2 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Commercial/Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
	Exp. Medium Total										4E-05					0.3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)anthracene	2.42E-07	µg/m³	1.97E-08	µg/m³	6.00E-05	m³/µg	1E-12	5.52E-08	µg/m³	--	--	--
				Benzo(a)pyrene	2.17E-07	µg/m³	1.77E-08	µg/m³	6.00E-04	m³/µg	1E-11	4.95E-08	µg/m³	2.00E-03	µg/m³	0.00002
				Benzo(b)fluoranthene	3.90E-07	µg/m³	3.18E-08	µg/m³	6.00E-05	m³/µg	2E-12	8.91E-08	µg/m³	--	--	--
				Indeno(1,2,3-cd)pyrene	1.18E-07	µg/m³	9.65E-09	µg/m³	6.00E-05	m³/µg	6E-13	2.70E-08	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	4.05E-07	µg/m³	3.30E-08	µg/m³	5.71E-04	m³/µg	2E-11	9.25E-08	µg/m³	--	--	--
				Aroclor 1260	1.76E-05	µg/m³	1.44E-06	µg/m³	5.71E-04	m³/µg	8E-10	4.03E-06	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	1.58E-11	µg/m³	1.29E-12	µg/m³	3.80E+01	m³/µg	5E-11	3.61E-12	µg/m³	4.00E-05	µg/m³	0.00000009
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.00E-11	µg/m³	8.18E-13	µg/m³	3.80E+01	m³/µg	3E-11	2.29E-12	µg/m³	4.00E-05	µg/m³	0.00000006
				Metals (Total)												
				Aluminum	6.40E-03	µg/m³	5.22E-04	µg/m³	--	--	--	1.46E-03	µg/m³	5.00E+00	µg/m³	0.0003
				Antimony	7.62E-07	µg/m³	6.21E-08	µg/m³	--	--	--	1.74E-07	µg/m³	3.00E-01	µg/m³	0.0000006
				Arsenic	9.54E-06	µg/m³	7.78E-07	µg/m³	4.30E-03	m³/µg	3E-09	2.18E-06	µg/m³	1.50E-02	µg/m³	0.0001
				Cadmium (Diet)	3.83E-07	µg/m³	3.12E-08	µg/m³	1.80E-03	m³/µg	6E-11	8.75E-08	µg/m³	1.00E-02	µg/m³	0.000009
				Chromium, Total	1.16E-05	µg/m³	9.45E-07	µg/m³	8.40E-02	m³/µg	8E-08	2.65E-06	µg/m³	1.00E-01	µg/m³	0.00003
				Cobalt	8.20E-06	µg/m³	6.69E-07	µg/m³	9.00E-03	m³/µg	6E-09	1.87E-06	µg/m³	6.00E-03	µg/m³	0.0003
				Iron	1.80E-02	µg/m³	1.47E-03	µg/m³	--	--	--	4.12E-03	µg/m³	--	--	--
				Manganese (Non-Diet)	3.62E-04	µg/m³	2.95E-05	µg/m³	--	--	--	8.26E-05	µg/m³	5.00E-02	µg/m³	0.002
				Thallium	1.21E-07	µg/m³	9.83E-09	µg/m³	--	--	--	2.75E-08	µg/m³	--	--	--
			Exp. Route Total								9E-08					0.002
		Exp. Point Total									9E-08					0.002
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)												
				Benzo(a)anthracene	4.45E-05	µg/m³	3.63E-06	µg/m³	6.00E-05	m³/µg	2E-10	1.02E-05	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	1.71E-03	µg/m³	1.39E-04	µg/m³	5.71E-04	m³/µg	8E-08	3.90E-04	µg/m³	--	--	--
				Aroclor 1260	6.62E-02	µg/m³	5.40E-03	µg/m³	5.71E-04	m³/µg	3E-06	1.51E-02	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	7.57E-09	µg/m³	6.18E-10	µg/m³	3.80E+01	m³/µg	2E-08	1.73E-09	µg/m³	4.00E-05	µg/m³	0.00004
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	4.81E-09	µg/m³	3.92E-10	µg/m³	3.80E+01	m³/µg	1E-08	1.10E-09	µg/m³	4.00E-05	µg/m³	0.00003
			Exp. Route Total								3E-06					0.00007
		Exp. Point Total									3E-06					0.00007
	Exp. Medium Total										3E-06					0.003
Medium Total											4E-05					0.3
Notes:											**Total of Receptor Risks Across All Media**					**Total of Receptor Hazards Across All Media**
											4E-05					**0.3**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table A-7.12a
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 8.8 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	4.88E-09	mg/kg-day	--	--	--	3.42E-07	mg/kg-day	3.00E-05	mg/kg-day	0.01
				Benzo(a)anthracene	5.09E-01	mg/kg	2.05E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	2E-09	1.44E-06	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	1.38E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	1E-08	9.66E-07	mg/kg-day	3.00E-04	mg/kg-day	0.003
				Benzo(b)fluoranthene	6.90E-01	mg/kg	2.78E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	3E-09	1.95E-06	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	6.09E-10	mg/kg-day	1.00E+00	1/(mg/kg-day)	6E-10	4.27E-08	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	7.14E-09	mg/kg-day	1.00E-01	1/(mg/kg-day)	7E-10	5.00E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	1.60E-10	mg/kg-day	1.60E+01	1/(mg/kg-day)	3E-09	1.12E-08	mg/kg-day	5.00E-05	mg/kg-day	0.0002
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	2.49E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	5E-09	1.74E-07	mg/kg-day	3.00E-05	mg/kg-day	0.006
				Aroclor 1260	1.18E+00	mg/kg	4.76E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	1E-07	3.33E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	9.21E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	1E-07	6.45E-11	mg/kg-day	2.00E-08	mg/kg-day	0.003
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	4.80E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	6E-08	3.36E-11	mg/kg-day	2.00E-08	mg/kg-day	0.002
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	3.43E-04	mg/kg-day	--	--	--	2.40E-02	mg/kg-day	1.00E+00	mg/kg-day	0.02
				Antimony	9.23E-01	mg/kg	3.73E-08	mg/kg-day	--	--	--	2.61E-06	mg/kg-day	4.00E-04	mg/kg-day	0.007
				Arsenic	1.22E+01	mg/kg	2.94E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	4E-07	2.06E-05	mg/kg-day	5.00E-03	mg/kg-day	0.004
				Cadmium (Diet)	3.32E-01	mg/kg	1.34E-08	mg/kg-day	--	--	--	9.38E-07	mg/kg-day	5.00E-04	mg/kg-day	0.002
				Chromium, Total	1.48E+01	mg/kg	5.99E-07	mg/kg-day	5.00E-01	1/(mg/kg-day)	3E-07	4.19E-05	mg/kg-day	5.00E-03	mg/kg-day	0.008
				Cobalt	1.03E+01	mg/kg	4.17E-07	mg/kg-day	--	--	--	2.92E-05	mg/kg-day	3.00E-03	mg/kg-day	0.01
				Iron	2.24E+04	mg/kg	9.05E-04	mg/kg-day	--	--	--	6.34E-02	mg/kg-day	7.00E-01	mg/kg-day	0.09
				Manganese (Non-Diet)	4.20E+02	mg/kg	1.69E-05	mg/kg-day	--	--	--	1.19E-03	mg/kg-day	2.40E-02	mg/kg-day	0.05
				Thallium	1.52E-01	mg/kg	6.14E-09	mg/kg-day	--	--	--	4.29E-07	mg/kg-day	4.00E-05	mg/kg-day	0.01
			Exp. Route Total								1E-06					0.2
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	1.57E-09	mg/kg-day	--	--	--	1.10E-07	mg/kg-day	3.00E-05	mg/kg-day	0.004
				Benzo(a)anthracene	5.09E-01	mg/kg	8.56E-09	mg/kg-day	1.00E-01	1/(mg/kg-day)	9E-10	5.99E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	5.75E-09	mg/kg-day	1.00E+00	1/(mg/kg-day)	6E-09	4.03E-07	mg/kg-day	3.00E-04	mg/kg-day	0.001
				Benzo(b)fluoranthene	6.90E-01	mg/kg	1.16E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	1E-09	8.13E-07	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	2.54E-10	mg/kg-day	1.00E+00	1/(mg/kg-day)	3E-10	1.78E-08	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	2.98E-09	mg/kg-day	1.00E-01	1/(mg/kg-day)	3E-10	2.08E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	5.14E-11	mg/kg-day	1.60E+01	1/(mg/kg-day)	8E-10	3.60E-09	mg/kg-day	5.00E-05	mg/kg-day	0.00007
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	1.12E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-09	7.83E-08	mg/kg-day	3.00E-05	mg/kg-day	0.003
				Aroclor 1260	1.18E+00	mg/kg	2.14E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	4E-08	1.50E-06	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	8.86E-14	mg/kg-day	1.30E+05	1/(mg/kg-day)	1E-08	6.20E-12	mg/kg-day	2.00E-08	mg/kg-day	0.0003
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	4.62E-14	mg/kg-day	1.30E+05	1/(mg/kg-day)	6E-09	3.23E-12	mg/kg-day	2.00E-08	mg/kg-day	0.0002

Table A-7.12a
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	1.10E-05	mg/kg-day	--	--	--	7.71E-04	mg/kg-day	1.00E+00	mg/kg-day	0.0008
				Antimony	9.23E-01	mg/kg	1.19E-09	mg/kg-day	--	--	--	8.36E-08	mg/kg-day	6.00E-05	mg/kg-day	0.001
				Arsenic	1.22E+01	mg/kg	4.72E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	7E-08	3.30E-06	mg/kg-day	5.00E-03	mg/kg-day	0.0007
				Cadmium (Diet)	3.32E-01	mg/kg	4.30E-11	mg/kg-day	--	--	--	3.01E-09	mg/kg-day	1.25E-05	mg/kg-day	0.0002
				Chromium, Total	1.48E+01	mg/kg	1.92E-08	mg/kg-day	2.00E+01	1/(mg/kg-day)	4E-07	1.34E-06	mg/kg-day	1.25E-04	mg/kg-day	0.01
				Cobalt	1.03E+01	mg/kg	1.34E-08	mg/kg-day	--	--	--	9.35E-07	mg/kg-day	3.00E-03	mg/kg-day	0.0003
				Iron	2.24E+04	mg/kg	2.90E-05	mg/kg-day	--	--	--	2.03E-03	mg/kg-day	7.00E-01	mg/kg-day	0.003
				Manganese (Non-Diet)	4.20E+02	mg/kg	5.43E-07	mg/kg-day	--	--	--	3.80E-05	mg/kg-day	9.60E-04	mg/kg-day	0.04
				Thallium	1.52E-01	mg/kg	1.97E-10	mg/kg-day	--	--	--	1.38E-08	mg/kg-day	4.00E-05	mg/kg-day	0.0003
			Exp. Route Total								5E-07					0.07
		Exp. Point Total									2E-06					0.3
	Exp. Medium Total										2E-06					0.3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)													
				1,2,4,5-Tetrachlorobenzene	1.60E-05	µg/m³	5.22E-08	µg/m³	--	--	--	3.65E-06	µg/m³	--	--	--
				Benzo(a)anthracene	6.73E-05	µg/m³	2.19E-07	µg/m³	6.00E-05	m³/µg	1E-11	1.54E-05	µg/m³	--	--	--
				Benzo(a)pyrene	4.52E-05	µg/m³	1.47E-07	µg/m³	6.00E-04	m³/µg	9E-11	1.03E-05	µg/m³	2.00E-03	µg/m³	0.005
				Benzo(b)fluoranthene	9.12E-05	µg/m³	2.97E-07	µg/m³	6.00E-05	m³/µg	2E-11	2.08E-05	µg/m³	--	--	--
				Dibenz(a,h)anthracene	2.00E-06	µg/m³	6.51E-09	µg/m³	6.00E-04	m³/µg	4E-12	4.56E-07	µg/m³	--	--	--
				Indeno(1,2,3-cd)pyrene	2.34E-05	µg/m³	7.63E-08	µg/m³	6.00E-05	m³/µg	5E-12	5.34E-06	µg/m³	--	--	--
				Pesticides												
				Dieldrin	5.25E-07	µg/m³	1.71E-09	µg/m³	4.60E-03	m³/µg	8E-12	1.20E-07	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	8.15E-06	µg/m³	2.66E-08	µg/m³	5.71E-04	m³/µg	2E-11	1.86E-06	µg/m³	--	--	--
				Aroclor 1260	1.56E-04	µg/m³	5.08E-07	µg/m³	5.71E-04	m³/µg	3E-10	3.56E-05	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	3.02E-09	µg/m³	9.84E-12	µg/m³	3.80E+01	m³/µg	4E-10	6.89E-10	µg/m³	4.00E-05	µg/m³	0.00002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.57E-09	µg/m³	5.13E-12	µg/m³	3.80E+01	m³/µg	2E-10	3.59E-10	µg/m³	4.00E-05	µg/m³	0.000009
				Metals (Total)												
				Aluminum	1.12E+00	µg/m³	3.67E-03	µg/m³	--	--	--	2.57E-01	µg/m³	5.00E+00	µg/m³	0.05
				Antimony	1.22E-04	µg/m³	3.98E-07	µg/m³	--	--	--	2.78E-05	µg/m³	1.00E+00	µg/m³	0.00003
				Arsenic	1.61E-03	µg/m³	5.24E-06	µg/m³	4.30E-03	m³/µg	2E-08	3.67E-04	µg/m³	1.50E-02	µg/m³	0.02
				Cadmium (Diet)	4.39E-05	µg/m³	1.43E-07	µg/m³	1.80E-03	m³/µg	3E-10	1.00E-05	µg/m³	9.00E-01	µg/m³	0.00001
				Chromium, Total	1.96E-03	µg/m³	6.40E-06	µg/m³	8.40E-02	m³/µg	5E-07	4.48E-04	µg/m³	3.00E-01	µg/m³	0.001
				Cobalt	1.36E-03	µg/m³	4.45E-06	µg/m³	9.00E-03	m³/µg	4E-08	3.11E-04	µg/m³	2.00E-02	µg/m³	0.02
				Iron	2.96E+00	µg/m³	9.66E-03	µg/m³	--	--	--	6.77E-01	µg/m³	--	--	--
				Manganese (Non-Diet)	5.55E-02	µg/m³	1.81E-04	µg/m³	--	--	--	1.27E-02	µg/m³	5.00E-02	µg/m³	0.3
				Thallium	2.01E-05	µg/m³	6.55E-08	µg/m³	--	--	--	4.59E-06	µg/m³	--	--	--
			Exp. Route Total								6E-07					0.4
		Exp. Point Total									6E-07					0.4
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)													
				1,2,4,5-Tetrachlorobenzene	1.12E-02	µg/m³	3.65E-05	µg/m³	--	--	--	2.55E-03	µg/m³	--	--	--
				Benzo(a)anthracene	2.64E-04	µg/m³	8.62E-07	µg/m³	6.00E-05	m³/µg	5E-11	6.04E-05	µg/m³	--	--	--

Table A-7.12a
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	7.34E-04	µg/m³	2.39E-06	µg/m³	5.71E-04	m³/µg	1E-09	1.68E-04	µg/m³	--	--	--
				Aroclor 1260	1.25E-02	µg/m³	4.07E-05	µg/m³	5.71E-04	m³/µg	2E-08	2.85E-03	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	3.09E-08	µg/m³	1.01E-10	µg/m³	3.80E+01	m³/µg	4E-09	7.05E-09	µg/m³	4.00E-05	µg/m³	0.0002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.61E-08	µg/m³	5.25E-11	µg/m³	3.80E+01	m³/µg	2E-09	3.67E-09	µg/m³	4.00E-05	µg/m³	0.00009
			Exp. Route Total								3E-08					0.0003
		Exp. Point Total									3E-08					0.0003
	Exp. Medium Total										6E-07					0.4
Medium Total											2E-06					0.6
Notes:											**Total of Receptor Risks Across All Media**					**Total of Receptor Hazards Across All Media**
											2E-06					**0.6**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table A-7.12b
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil	0 - 8.8 feet	Ingestion													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	4.88E-09	mg/kg-day	--	--	--	3.42E-07	mg/kg-day	3.00E-05	mg/kg-day	0.01
				Benzo(a)anthracene	5.09E-01	mg/kg	2.05E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	2E-09	1.44E-06	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	1.38E-08	mg/kg-day	1.00E+00	1/(mg/kg-day)	1E-08	9.66E-07	mg/kg-day	3.00E-04	mg/kg-day	0.003
				Benzo(b)fluoranthene	6.90E-01	mg/kg	2.78E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	3E-09	1.95E-06	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	6.09E-10	mg/kg-day	1.00E+00	1/(mg/kg-day)	6E-10	4.27E-08	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	7.14E-09	mg/kg-day	1.00E-01	1/(mg/kg-day)	7E-10	5.00E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	1.60E-10	mg/kg-day	1.60E+01	1/(mg/kg-day)	3E-09	1.12E-08	mg/kg-day	5.00E-05	mg/kg-day	0.0002
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	2.49E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	5E-09	1.74E-07	mg/kg-day	3.00E-05	mg/kg-day	0.006
				Aroclor 1260	2.40E+01	mg/kg	9.69E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-06	6.78E-05	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	9.21E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	1E-07	6.45E-11	mg/kg-day	2.00E-08	mg/kg-day	0.003
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	4.80E-13	mg/kg-day	1.30E+05	1/(mg/kg-day)	6E-08	3.36E-11	mg/kg-day	2.00E-08	mg/kg-day	0.002
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	3.43E-04	mg/kg-day	--	--	--	2.40E-02	mg/kg-day	1.00E+00	mg/kg-day	0.02
				Antimony	9.23E-01	mg/kg	3.73E-08	mg/kg-day	--	--	--	2.61E-06	mg/kg-day	4.00E-04	mg/kg-day	0.007
				Arsenic	1.22E+01	mg/kg	2.94E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	4E-07	2.06E-05	mg/kg-day	5.00E-03	mg/kg-day	0.004
				Cadmium (Diet)	3.32E-01	mg/kg	1.34E-08	mg/kg-day	--	--	--	9.38E-07	mg/kg-day	5.00E-04	mg/kg-day	0.002
				Chromium, Total	1.48E+01	mg/kg	5.99E-07	mg/kg-day	5.00E-01	1/(mg/kg-day)	3E-07	4.19E-05	mg/kg-day	5.00E-03	mg/kg-day	0.008
				Cobalt	1.03E+01	mg/kg	4.17E-07	mg/kg-day	--	--	--	2.92E-05	mg/kg-day	3.00E-03	mg/kg-day	0.01
				Iron	2.24E+04	mg/kg	9.05E-04	mg/kg-day	--	--	--	6.34E-02	mg/kg-day	7.00E-01	mg/kg-day	0.09
				Manganese (Non-Diet)	4.20E+02	mg/kg	1.69E-05	mg/kg-day	--	--	--	1.19E-03	mg/kg-day	2.40E-02	mg/kg-day	0.05
				Thallium	1.52E-01	mg/kg	6.14E-09	mg/kg-day	--	--	--	4.29E-07	mg/kg-day	4.00E-05	mg/kg-day	0.01
			Exp. Route Total								3E-06					0.2
			Dermal													
				Semi-volatile Organic Compounds (SVOCs)												
				1,2,4,5-Tetrachlorobenzene	1.21E-01	mg/kg	1.57E-09	mg/kg-day	--	--	--	1.10E-07	mg/kg-day	3.00E-05	mg/kg-day	0.004
				Benzo(a)anthracene	5.09E-01	mg/kg	8.56E-09	mg/kg-day	1.00E-01	1/(mg/kg-day)	9E-10	5.99E-07	mg/kg-day	--	--	--
				Benzo(a)pyrene	3.42E-01	mg/kg	5.75E-09	mg/kg-day	1.00E+00	1/(mg/kg-day)	6E-09	4.03E-07	mg/kg-day	3.00E-04	mg/kg-day	0.001
				Benzo(b)fluoranthene	6.90E-01	mg/kg	1.16E-08	mg/kg-day	1.00E-01	1/(mg/kg-day)	1E-09	8.13E-07	mg/kg-day	--	--	--
				Dibenz(a,h)anthracene	1.51E-02	mg/kg	2.54E-10	mg/kg-day	1.00E+00	1/(mg/kg-day)	3E-10	1.78E-08	mg/kg-day	--	--	--
				Indeno(1,2,3-cd)pyrene	1.77E-01	mg/kg	2.98E-09	mg/kg-day	1.00E-01	1/(mg/kg-day)	3E-10	2.08E-07	mg/kg-day	--	--	--
				Pesticides												
				Dieldrin	3.97E-03	mg/kg	5.14E-11	mg/kg-day	1.60E+01	1/(mg/kg-day)	8E-10	3.60E-09	mg/kg-day	5.00E-05	mg/kg-day	0.00007
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	6.17E-02	mg/kg	1.12E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	2E-09	7.83E-08	mg/kg-day	3.00E-05	mg/kg-day	0.003
				Aroclor 1260	2.40E+01	mg/kg	4.35E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	9E-07	3.04E-05	mg/kg-day	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	2.28E-05	mg/kg	8.86E-14	mg/kg-day	1.30E+05	1/(mg/kg-day)	1E-08	6.20E-12	mg/kg-day	2.00E-08	mg/kg-day	0.0003
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.19E-05	mg/kg	4.62E-14	mg/kg-day	1.30E+05	1/(mg/kg-day)	6E-09	3.23E-12	mg/kg-day	2.00E-08	mg/kg-day	0.0002

Table A-7.12b
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Metals (Total)												
				Aluminum	8.51E+03	mg/kg	1.10E-05	mg/kg-day	--	--	--	7.71E-04	mg/kg-day	1.00E+00	mg/kg-day	0.0008
				Antimony	9.23E-01	mg/kg	1.19E-09	mg/kg-day	--	--	--	8.36E-08	mg/kg-day	6.00E-05	mg/kg-day	0.001
				Arsenic	1.22E+01	mg/kg	4.72E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	7E-08	3.30E-06	mg/kg-day	5.00E-03	mg/kg-day	0.0007
				Cadmium (Diet)	3.32E-01	mg/kg	4.30E-11	mg/kg-day	--	--	--	3.01E-09	mg/kg-day	1.25E-05	mg/kg-day	0.0002
				Chromium, Total	1.48E+01	mg/kg	1.92E-08	mg/kg-day	2.00E+01	1/(mg/kg-day)	4E-07	1.34E-06	mg/kg-day	1.25E-04	mg/kg-day	0.01
				Cobalt	1.03E+01	mg/kg	1.34E-08	mg/kg-day	--	--	--	9.35E-07	mg/kg-day	3.00E-03	mg/kg-day	0.0003
				Iron	2.24E+04	mg/kg	2.90E-05	mg/kg-day	--	--	--	2.03E-03	mg/kg-day	7.00E-01	mg/kg-day	0.003
				Manganese (Non-Diet)	4.20E+02	mg/kg	5.43E-07	mg/kg-day	--	--	--	3.80E-05	mg/kg-day	9.60E-04	mg/kg-day	0.04
				Thallium	1.52E-01	mg/kg	1.97E-10	mg/kg-day	--	--	--	1.38E-08	mg/kg-day	4.00E-05	mg/kg-day	0.0003
			Exp. Route Total								1E-06					0.07
		Exp. Point Total									4E-06					0.3
	Exp. Medium Total										4E-06					0.3
	Outdoor Air	Particulates above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)													
				1,2,4,5-Tetrachlorobenzene	1.60E-05	µg/m³	5.22E-08	µg/m³	--	--	--	3.65E-06	µg/m³	--	--	--
				Benzo(a)anthracene	6.73E-05	µg/m³	2.19E-07	µg/m³	6.00E-05	m³/µg	1E-11	1.54E-05	µg/m³	--	--	--
				Benzo(a)pyrene	4.52E-05	µg/m³	1.47E-07	µg/m³	6.00E-04	m³/µg	9E-11	1.03E-05	µg/m³	2.00E-03	µg/m³	0.005
				Benzo(b)fluoranthene	9.12E-05	µg/m³	2.97E-07	µg/m³	6.00E-05	m³/µg	2E-11	2.08E-05	µg/m³	--	--	--
				Dibenz(a,h)anthracene	2.00E-06	µg/m³	6.51E-09	µg/m³	6.00E-04	m³/µg	4E-12	4.56E-07	µg/m³	--	--	--
				Indeno(1,2,3-cd)pyrene	2.34E-05	µg/m³	7.63E-08	µg/m³	6.00E-05	m³/µg	5E-12	5.34E-06	µg/m³	--	--	--
				Pesticides												
				Dieldrin	5.25E-07	µg/m³	1.71E-09	µg/m³	4.60E-03	m³/µg	8E-12	1.20E-07	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	8.15E-06	µg/m³	2.66E-08	µg/m³	5.71E-04	m³/µg	2E-11	1.86E-06	µg/m³	--	--	--
				Aroclor 1260	3.17E-03	µg/m³	1.03E-05	µg/m³	5.71E-04	m³/µg	6E-09	7.24E-04	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	3.02E-09	µg/m³	9.84E-12	µg/m³	3.80E+01	m³/µg	4E-10	6.89E-10	µg/m³	4.00E-05	µg/m³	0.00002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.57E-09	µg/m³	5.13E-12	µg/m³	3.80E+01	m³/µg	2E-10	3.59E-10	µg/m³	4.00E-05	µg/m³	0.000009
				Metals (Total)												
				Aluminum	1.12E+00	µg/m³	3.67E-03	µg/m³	--	--	--	2.57E-01	µg/m³	5.00E+00	µg/m³	0.05
				Antimony	1.22E-04	µg/m³	3.98E-07	µg/m³	--	--	--	2.78E-05	µg/m³	1.00E+00	µg/m³	0.00003
				Arsenic	1.61E-03	µg/m³	5.24E-06	µg/m³	4.30E-03	m³/µg	2E-08	3.67E-04	µg/m³	1.50E-02	µg/m³	0.02
				Cadmium (Diet)	4.39E-05	µg/m³	1.43E-07	µg/m³	1.80E-03	m³/µg	3E-10	1.00E-05	µg/m³	9.00E-01	µg/m³	0.00001
				Chromium, Total	1.96E-03	µg/m³	6.40E-06	µg/m³	8.40E-02	m³/µg	5E-07	4.48E-04	µg/m³	3.00E-01	µg/m³	0.001
				Cobalt	1.36E-03	µg/m³	4.45E-06	µg/m³	9.00E-03	m³/µg	4E-08	3.11E-04	µg/m³	2.00E-02	µg/m³	0.02
				Iron	2.96E+00	µg/m³	9.66E-03	µg/m³	--	--	--	6.77E-01	µg/m³	--	--	--
				Manganese (Non-Diet)	5.55E-02	µg/m³	1.81E-04	µg/m³	--	--	--	1.27E-02	µg/m³	5.00E-02	µg/m³	0.3
				Thallium	2.01E-05	µg/m³	6.55E-08	µg/m³	--	--	--	4.59E-06	µg/m³	--	--	--
			Exp. Route Total								6E-07					0.4
		Exp. Point Total									6E-07					0.4
		Vapors above Site	Inhalation													
				Semi-volatile Organic Compounds (SVOCs)													
				1,2,4,5-Tetrachlorobenzene	1.12E-02	µg/m³	3.65E-05	µg/m³	--	--	--	2.55E-03	µg/m³	--	--	--
				Benzo(a)anthracene	2.64E-04	µg/m³	8.62E-07	µg/m³	6.00E-05	m³/µg	5E-11	6.04E-05	µg/m³	--	--	--

Table A-7.12b
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk [1]	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient [1]
							Value	Units	Value	Units		Value	Units	Value	Units	
				Polychlorinated Biphenyls (PCBs)												
				Aroclor 1254	7.34E-04	µg/m³	2.39E-06	µg/m³	5.71E-04	m³/µg	1E-09	1.68E-04	µg/m³	--	--	--
				Aroclor 1260	2.54E-01	µg/m³	8.29E-04	µg/m³	5.71E-04	m³/µg	5E-07	5.80E-02	µg/m³	--	--	--
				Polychlorinated Biphenyls (PCBs) - Congeners												
				PCBC TEQ MAMMAL HALFND	3.09E-08	µg/m³	1.01E-10	µg/m³	3.80E+01	m³/µg	4E-09	7.05E-09	µg/m³	4.00E-05	µg/m³	0.0002
				Dioxins and Furans												
				DIOXIN TEQ MAMMAL HALFND	1.61E-08	µg/m³	5.25E-11	µg/m³	3.80E+01	m³/µg	2E-09	3.67E-09	µg/m³	4.00E-05	µg/m³	0.00009
			Exp. Route Total								5E-07					0.0003
		Exp. Point Total									5E-07					0.0003
	Exp. Medium Total										1E-06					0.4
Medium Total											5E-06					0.6
Notes:											**Total of Receptor Risks Across All Media**					**Total of Receptor Hazards Across All Media**
											5E-06					**0.6**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table A-9.1
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Adult) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	0 - 0.5 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	--	--	DV	0.0005	0.0003	--	0.0007
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.05	0.006	--	0.06
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.04	0.005	--	0.04
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.01	0.0004	--	0.01
			Arsenic	--	--	--	--	CV; DM	0.02	0.004	--	0.03
			Chromium, Total	--	--	--	--	N/A	0.005	0.008	--	0.01
			Cobalt	--	--	--	--	EN	0.04	0.002	--	0.05
			Iron	--	--	--	--	GI	0.04	0.002	--	0.04
			Manganese (Non-Diet)	--	--	--	--	NV	0.02	0.02	--	0.05
			Thallium	--	--	--	--	DM	0.02	0.0007	--	0.02
			Chemical Total	--	--	--	--		**0.2**	**0.05**	--	**0.3**
		Exposure Point Total					--					**0.3**
	Exposure Medium Total						--					**0.3**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	--	--	DV	--	--	0.00004	0.00004
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000005	0.0000005
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000004	0.0000004
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.001	0.001
			Arsenic	--	--	--	--	CV; DM; DV; NV; RP; RS	--	--	0.0004	0.0004
			Chromium, Total	--	--	--	--	RS	--	--	0.00009	0.00009
			Cobalt	--	--	--	--	RS	--	--	0.001	0.001
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.007	0.007
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	--	--		--	--	**0.01**	**0.01**
		Exposure Point Total					--					**0.01**

Table A-9.1
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Adult) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk [2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
		Vapors above Site										
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Chemical Total	**--**	**--**	**--**	**--**		**--**	**--**	**0.0004**	**0.0004**
		Exposure Point Total					**--**					**0.0004**
	Exposure Medium Total						**--**					**0.01**
Medium Total							**--**					**0.3**
Notes:						**Receptor Risk Total**	**--**				**Receptor Hazard Index (HI)**	**0.3**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.03**
Total Dermal (DM) HI across All Media =	**0.04**
Total Developmental (DV) HI across All Media =	**0.1**
Total Endocrine (EN) HI across All Media =	**0.1**
Total Gastrointestinal (GI) HI across All Media =	**0.04**
Total Hematological (HM) HI across All Media =	**0.0004**
Total Hepatic (HP) HI across All Media =	**0.0004**
Total Nervous (NV) HI across All Media =	**0.07**
Total Reproductive (RP) HI across All Media =	**0.1**
Total Respiratory (RS) HI across All Media =	**0.002**

Table A-9.2
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Child) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	0 - 0.5 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	--	--	DV	0.005	0.001	--	0.006
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.5	0.04	--	0.6
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.4	0.03	--	0.4
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.1	0.003	--	0.1
			Arsenic	--	--	--	--	CV; DM	0.2	0.03	--	0.2
			Chromium, Total	--	--	--	--	N/A	0.05	0.05	--	0.1
			Cobalt	--	--	--	--	EN	0.5	0.01	--	0.5
			Iron	--	--	--	--	GI	0.5	0.01	--	0.5
			Manganese (Non-Diet)	--	--	--	--	NV	0.3	0.1	--	0.4
			Thallium	--	--	--	--	DM	0.2	0.004	--	0.2
			Chemical Total	--	--	--	--		3	0.3	--	3
		Exposure Point Total					--					3
	Exposure Medium Total						--					3
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	--	--	DV	--	--	0.00004	0.00004
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000005	0.0000005
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000004	0.0000004
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.001	0.001
			Arsenic	--	--	--	--	CV; DM; DV; NV; RP; RS	--	--	0.0004	0.0004
			Chromium, Total	--	--	--	--	RS	--	--	0.00009	0.00009
			Cobalt	--	--	--	--	RS	--	--	0.001	0.001
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.007	0.007
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	--	--		--	--	0.01	0.01
		Exposure Point Total					--					0.01
		Vapors above Site										
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002

Table A-9.2
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Child) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Chemical Total	**--**	**--**	**--**	**--**		**--**	**--**	**0.0004**	**0.0004**
		Exposure Point Total					**--**					**0.0004**
	Exposure Medium Total						**--**					**0.01**
Medium Total							**--**					**3**
Notes:							**Receptor Risk Total**	**--**			**Receptor Hazard Index (HI)**	**3**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.2**
Total Dermal (DM) HI across All Media =	**0.4**
Total Developmental (DV) HI across All Media =	**1**
Total Endocrine (EN) HI across All Media =	**2**
Total Gastrointestinal (GI) HI across All Media =	**0.5**
Total Hematological (HM) HI across All Media =	**0.0004**
Total Hepatic (HP) HI across All Media =	**0.0004**
Total Nervous (NV) HI across All Media =	**0.5**
Total Reproductive (RP) HI across All Media =	**1**
Total Respiratory (RS) HI across All Media =	**0.002**

Table A-9.3
Summary of Chemical Cancer Risks for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Lifetime) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	0 - 0.5 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	7E-07	2E-07	--	1E-06	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	**5E-06**	**2E-06**	--	**6E-06**	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	**5E-06**	5E-07	--	**6E-06**	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	**4E-06**	3E-07	--	**4E-06**	--	--	--	--	--
			Metals (Total)									
			Aluminum	--	--	--	--	--	--	--	--	--
			Arsenic	**1E-05**	**2E-06**	--	**1E-05**	--	--	--	--	--
			Chromium, Total	**4E-05**	**4E-05**	--	**8E-05**	--	--	--	--	--
			Cobalt	--	--	--	--	--	--	--	--	--
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	--	--	--	--	--
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	**7E-05**	**5E-05**	**--**	**1E-04**		**--**	**--**	**--**	**--**
		Exposure Point Total					**1E-04**					**--**
	Exposure Medium Total						**1E-04**					**--**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	5E-11	5E-11	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	2E-10	2E-10	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	3E-10	3E-10	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	2E-10	2E-10	--	--	--	--	--
			Metals (Total)									
			Aluminum	--	--	--	--	--	--	--	--	--
			Arsenic	--	--	1E-08	1E-08	--	--	--	--	--
			Chromium, Total	--	--	8E-07	8E-07	--	--	--	--	--
			Cobalt	--	--	3E-08	3E-08	--	--	--	--	--
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	--	--	--	--	--
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	**--**	**--**	**8E-07**	**8E-07**		**--**	**--**	**--**	**--**
		Exposure Point Total					**8E-07**					**--**

Table A-9.3
Summary of Chemical Cancer Risks for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Lifetime) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
		Vapors above Site										
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	9E-07	9E-07	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	1E-07	1E-07	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	1E-07	1E-07	--	--	--	--	--
			Chemical Total	**--**	**--**	**1E-06**	**1E-06**		**--**	**--**	**--**	**--**
		Exposure Point Total					**1E-06**					**--**
	Exposure Medium Total						**2E-06**					**--**
Medium Total							**1E-04**					**--**
Notes:						**Receptor Risk Total**	**1E-04**				**Receptor Hazard Index (HI)**	**--**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table A-9.4a
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 8.8 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	UR	0.0005	0.0002	--	0.0007
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Benzo(a)pyrene	--	--	--	--	DV	0.001	0.0008	--	0.002
			Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	--	--	HP	0.0001	0.00004	--	0.0001
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	DM; IM; OC	0.004	0.002	--	0.006
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.04	0.005	--	0.04
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.02	0.003	--	0.02
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.01	0.0004	--	0.01
			Antimony	--	--	--	--	HM; OT	0.003	0.0008	--	0.004
			Arsenic	--	--	--	--	CV; DM	0.03	0.006	--	0.04
			Cadmium (Diet)	--	--	--	--	UR	0.0004	0.00007	--	0.0005
			Chromium, Total	--	--	--	--	N/A	0.006	0.01	--	0.02
			Cobalt	--	--	--	--	EN	0.04	0.002	--	0.04
			Iron	--	--	--	--	GI	0.04	0.002	--	0.04
			Manganese (Non-Diet)	--	--	--	--	NV	0.02	0.02	--	0.04
			Thallium	--	--	--	--	DM	0.02	0.0008	--	0.02
			Chemical Total	--	--	--	--		**0.2**	**0.05**	--	**0.3**
		Exposure Point Total					--					**0.3**
	Exposure Medium Total						--					**0.3**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Benzo(a)pyrene	--	--	--	--	DV	--	--	0.0001	0.0001
			Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	--	--	--	--	--
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000004	0.0000004
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000002	0.0000002

Table A-9.4a
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.001	0.001
			Antimony	--	--	--	--	RS	--	--	0.000002	0.000002
			Arsenic	--	--	--	--	CV; DM; DV; NV; RP; RS	--	--	0.0006	0.0006
			Cadmium (Diet)	--	--	--	--	UR	--	--	0.00002	0.00002
			Chromium, Total	--	--	--	--	RS	--	--	0.0001	0.0001
			Cobalt	--	--	--	--	RS	--	--	0.001	0.001
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.006	0.006
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	--	--		--	--	**0.009**	**0.009**
		Exposure Point Total					--					**0.009**
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	--	--	--	--	--
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0001	0.0001
			Chemical Total	--	--	--	--		--	--	**0.0003**	**0.0003**
		Exposure Point Total					--					**0.0003**
	Exposure Medium Total						--					**0.009**
Medium Total							--					**0.3**
Notes:						**Receptor Risk Total**	--				**Receptor Hazard Index (HI)**	**0.3**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.04**
Total Dermal (DM) HI across All Media =	**0.06**
Total Developmental (DV) HI across All Media =	**0.07**
Total Endocrine (EN) HI across All Media =	**0.1**
Total Gastrointestinal (GI) HI across All Media =	**0.04**
Total Hematological (HM) HI across All Media =	**0.004**
Total Hepatic (HP) HI across All Media =	**0.0004**
Total Immune (IM) HI across All Media =	**0.006**
Total Nervous (NV) HI across All Media =	**0.06**
Total Ocular (OC) HI across All Media =	**0.006**
Total Other (OT) HI across All Media =	**0.004**
Total Reproductive (RP) HI across All Media =	**0.07**
Total Respiratory (RS) HI across All Media =	**0.002**
Total Urinary (UR) HI across All Media =	**0.001**

Table A-9.4b
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 8.8 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	UR	0.0005	0.0002	--	0.0007
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Benzo(a)pyrene	--	--	--	--	DV	0.001	0.0008	--	0.002
			Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	--	--	HP	0.0001	0.00004	--	0.0001
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	DM; IM; OC	0.004	0.002	--	0.006
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.04	0.005	--	0.04
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.02	0.003	--	0.02
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.01	0.0004	--	0.01
			Antimony	--	--	--	--	HM; OT	0.003	0.0008	--	0.004
			Arsenic	--	--	--	--	CV; DM	0.03	0.006	--	0.04
			Cadmium (Diet)	--	--	--	--	UR	0.0004	0.00007	--	0.0005
			Chromium, Total	--	--	--	--	N/A	0.006	0.01	--	0.02
			Cobalt	--	--	--	--	EN	0.04	0.002	--	0.04
			Iron	--	--	--	--	GI	0.04	0.002	--	0.04
			Manganese (Non-Diet)	--	--	--	--	NV	0.02	0.02	--	0.04
			Thallium	--	--	--	--	DM	0.02	0.0008	--	0.02
			Chemical Total	--	--	--	--		**0.2**	**0.05**	--	**0.3**
		Exposure Point Total					--					**0.3**
	Exposure Medium Total						--					**0.3**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Benzo(a)pyrene	--	--	--	--	DV	--	--	0.0001	0.0001
			Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	--	--	--	--	--
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000004	0.0000004
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000002	0.0000002

Table A-9.4b
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Adult) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.001	0.001
			Antimony	--	--	--	--	RS	--	--	0.000002	0.000002
			Arsenic	--	--	--	--	CV; DM; DV; NV; RP; RS	--	--	0.0006	0.0006
			Cadmium (Diet)	--	--	--	--	UR	--	--	0.00002	0.00002
			Chromium, Total	--	--	--	--	RS	--	--	0.0001	0.0001
			Cobalt	--	--	--	--	RS	--	--	0.001	0.001
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.006	0.006
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	--	--		--	--	**0.009**	**0.009**
		Exposure Point Total					--					**0.009**
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	--	--	--	--	--
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0001	0.0001
			Chemical Total	--	--	--	--		--	--	**0.0003**	**0.0003**
		Exposure Point Total					--					**0.0003**
	Exposure Medium Total						--					**0.009**
Medium Total							--					**0.3**
Notes:						**Receptor Risk Total**	--				**Receptor Hazard Index (HI)**	**0.3**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.04**
Total Dermal (DM) HI across All Media =	**0.06**
Total Developmental (DV) HI across All Media =	**0.07**
Total Endocrine (EN) HI across All Media =	**0.1**
Total Gastrointestinal (GI) HI across All Media =	**0.04**
Total Hematological (HM) HI across All Media =	**0.004**
Total Hepatic (HP) HI across All Media =	**0.0004**
Total Immune (IM) HI across All Media =	**0.006**
Total Nervous (NV) HI across All Media =	**0.06**
Total Ocular (OC) HI across All Media =	**0.006**
Total Other (OT) HI across All Media =	**0.004**
Total Reproductive (RP) HI across All Media =	**0.07**
Total Respiratory (RS) HI across All Media =	**0.002**
Total Urinary (UR) HI across All Media =	**0.001**

Table A-9.5a
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 8.8 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	UR	0.005	0.001	--	0.006
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Benzo(a)pyrene	--	--	--	--	DV	0.01	0.004	--	0.02
			Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	--	--	HP	0.001	0.0002	--	0.001
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	DM; IM; OC	0.04	0.01	--	0.05
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.4	0.03	--	0.4
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.2	0.02	--	0.2
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.1	0.003	--	0.1
			Antimony	--	--	--	--	HM; OT	0.03	0.005	--	0.03
			Arsenic	--	--	--	--	CV; DM	0.3	0.04	--	0.3
			Cadmium (Diet)	--	--	--	--	UR	0.004	0.0004	--	0.005
			Chromium, Total	--	--	--	--	N/A	0.06	0.06	--	0.1
			Cobalt	--	--	--	--	EN	0.4	0.01	--	0.5
			Iron	--	--	--	--	GI	0.4	0.01	--	0.4
			Manganese (Non-Diet)	--	--	--	--	NV	0.2	0.1	--	0.4
			Thallium	--	--	--	--	DM	0.2	0.005	--	0.2
			Chemical Total	--	--	--	--		2	0.3	--	3
		Exposure Point Total					--					3
	Exposure Medium Total						--					3
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Benzo(a)pyrene	--	--	--	--	DV	--	--	0.0001	0.0001
			Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	--	--	--	--	--
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000004	0.0000004
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000002	0.0000002

Table A-9.5a
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.001	0.001
			Antimony	--	--	--	--	RS	--	--	0.000002	0.000002
			Arsenic	--	--	--	--	CV; DM; DV; NV; RP; RS	--	--	0.0006	0.0006
			Cadmium (Diet)	--	--	--	--	UR	--	--	0.00002	0.00002
			Chromium, Total	--	--	--	--	RS	--	--	0.0001	0.0001
			Cobalt	--	--	--	--	RS	--	--	0.001	0.001
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.006	0.006
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	--	--		--	--	**0.009**	**0.009**
		Exposure Point Total					--					**0.009**
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	--	--	--	--	--
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0001	0.0001
			Chemical Total	--	--	--	--		--	--	**0.0003**	**0.0003**
		Exposure Point Total					--					**0.0003**
	Exposure Medium Total						--					**0.009**
Medium Total							--					3
Notes:							**Receptor Risk Total** --					**Receptor Hazard Index (HI)** 3

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.3**
Total Dermal (DM) HI across All Media =	**0.6**
Total Developmental (DV) HI across All Media =	**0.7**
Total Endocrine (EN) HI across All Media =	**1**
Total Gastrointestinal (GI) HI across All Media =	**0.4**
Total Hematological (HM) HI across All Media =	**0.03**
Total Hepatic (HP) HI across All Media =	**0.002**
Total Immune (IM) HI across All Media =	**0.05**
Total Nervous (NV) HI across All Media =	**0.5**
Total Ocular (OC) HI across All Media =	**0.05**
Total Other (OT) HI across All Media =	**0.03**
Total Reproductive (RP) HI across All Media =	**0.7**
Total Respiratory (RS) HI across All Media =	**0.002**
Total Urinary (UR) HI across All Media =	**0.01**

Table A-9.5b
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 8.8 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	UR	0.005	0.001	--	0.006
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Benzo(a)pyrene	--	--	--	--	DV	0.01	0.004	--	0.02
			Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	--	--	HP	0.001	0.0002	--	0.001
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	DM; IM; OC	0.04	0.01	--	0.05
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.4	0.03	--	0.4
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.2	0.02	--	0.2
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.1	0.003	--	0.1
			Antimony	--	--	--	--	HM; OT	0.03	0.005	--	0.03
			Arsenic	--	--	--	--	CV; DM	0.3	0.04	--	0.3
			Cadmium (Diet)	--	--	--	--	UR	0.004	0.0004	--	0.005
			Chromium, Total	--	--	--	--	N/A	0.06	0.06	--	0.1
			Cobalt	--	--	--	--	EN	0.4	0.01	--	0.5
			Iron	--	--	--	--	GI	0.4	0.01	--	0.4
			Manganese (Non-Diet)	--	--	--	--	NV	0.2	0.1	--	0.4
			Thallium	--	--	--	--	DM	0.2	0.005	--	0.2
			Chemical Total	--	--	--	--		2	0.3	--	3
		Exposure Point Total					--					3
	Exposure Medium Total						--					3
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Benzo(a)pyrene	--	--	--	--	DV	--	--	0.0001	0.0001
			Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	--	--	--	--	--
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000004	0.0000004
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000002	0.0000002

Table A-9.5b
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Child) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.001	0.001
			Antimony	--	--	--	--	RS	--	--	0.000002	0.000002
			Arsenic	--	--	--	--	CV; DM; DV; NV; RP; RS	--	--	0.0006	0.0006
			Cadmium (Diet)	--	--	--	--	UR	--	--	0.00002	0.00002
			Chromium, Total	--	--	--	--	RS	--	--	0.0001	0.0001
			Cobalt	--	--	--	--	RS	--	--	0.001	0.001
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.006	0.006
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	--	--		--	--	**0.009**	**0.009**
		Exposure Point Total					--					**0.009**
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	--	--	--	--	--	--	--
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0001	0.0001
			Chemical Total	--	--	--	--		--	--	**0.0003**	**0.0003**
		Exposure Point Total					--					**0.0003**
	Exposure Medium Total						--					**0.009**
Medium Total							--					3
Notes:							**Receptor Risk Total** --					**Receptor Hazard Index (HI)** 3

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.3**
Total Dermal (DM) HI across All Media =	**0.6**
Total Developmental (DV) HI across All Media =	**0.7**
Total Endocrine (EN) HI across All Media =	**1**
Total Gastrointestinal (GI) HI across All Media =	**0.4**
Total Hematological (HM) HI across All Media =	**0.03**
Total Hepatic (HP) HI across All Media =	**0.002**
Total Immune (IM) HI across All Media =	**0.05**
Total Nervous (NV) HI across All Media =	**0.5**
Total Ocular (OC) HI across All Media =	**0.05**
Total Other (OT) HI across All Media =	**0.03**
Total Reproductive (RP) HI across All Media =	**0.7**
Total Respiratory (RS) HI across All Media =	**0.002**
Total Urinary (UR) HI across All Media =	**0.01**

Table A-9.6a
Summary of Chemical Cancer Risks for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 8.8 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	3E-07	1E-07	--	4E-07	--	--	--	--	--
			Benzo(a)pyrene	**2E-06**	7E-07	--	**3E-06**	--	--	--	--	--
			Benzo(b)fluoranthene	5E-07	2E-07	--	6E-07	--	--	--	--	--
			Dibenz(a,h)anthracene	1E-07	3E-08	--	1E-07	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-07	4E-08	--	2E-07	--	--	--	--	--
			Pesticides									
			Dieldrin	9E-08	3E-08	--	1E-07	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	2E-07	7E-08	--	2E-07	--	--	--	--	--
			Aroclor 1260	**3E-06**	1E-06	--	**5E-06**	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	**4E-06**	4E-07	--	**5E-06**	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	**2E-06**	2E-07	--	**2E-06**	--	--	--	--	--
			Metals (Total)									
			Aluminum	--	--	--	--	--	--	--	--	--
			Antimony	--	--	--	--	--	--	--	--	--
			Arsenic	**2E-05**	**2E-06**	--	**2E-05**	--	--	--	--	--
			Cadmium (Diet)	--	--	--	--	--	--	--	--	--
			Chromium, Total	**5E-05**	**5E-05**	--	**1E-04**	--	--	--	--	--
			Cobalt	--	--	--	--	--	--	--	--	--
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	--	--	--	--	--
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	**8E-05**	**6E-05**	--	**1E-04**		--	--	--	--
		Exposure Point Total					**1E-04**					--
	Exposure Medium Total						**1E-04**					--
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	2E-11	2E-11	--	--	--	--	--
			Benzo(a)pyrene	--	--	1E-10	1E-10	--	--	--	--	--
			Benzo(b)fluoranthene	--	--	3E-11	3E-11	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	7E-12	7E-12	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	8E-12	8E-12	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	5E-12	5E-12	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	9E-12	9E-12	--	--	--	--	--
			Aroclor 1260	--	--	2E-10	2E-10	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	2E-10	2E-10	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	1E-10	1E-10	--	--	--	--	--

Table A-9.6a
Summary of Chemical Cancer Risks for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Metals (Total)									
			Aluminum	--	--	--	--	--	--	--	--	--
			Antimony	--	--	--	--	--	--	--	--	--
			Arsenic	--	--	1E-08	1E-08	--	--	--	--	--
			Cadmium (Diet)	--	--	2E-10	2E-10	--	--	--	--	--
			Chromium, Total	--	--	9E-07	9E-07	--	--	--	--	--
			Cobalt	--	--	2E-08	2E-08	--	--	--	--	--
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	--	--	--	--	--
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	9E-07	9E-07		--	--	--	--
		Exposure Point Total					9E-07					--
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	4E-09	4E-09	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	4E-08	4E-08	--	--	--	--	--
			Aroclor 1260	--	--	6E-07	6E-07	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	1E-07	1E-07	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	6E-08	6E-08	--	--	--	--	--
			Chemical Total	--	--	9E-07	9E-07		--	--	--	--
		Exposure Point Total					9E-07					--
	Exposure Medium Total						2E-06					--
Medium Total							1E-04					--
Notes:						**Receptor Risk Total**	1E-04				**Receptor Hazard Index (HI)**	--

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table A-9.6b
Summary of Chemical Cancer Risks for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 8.8 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	3E-07	1E-07	--	4E-07	--	--	--	--	--
			Benzo(a)pyrene	**2E-06**	7E-07	--	**3E-06**	--	--	--	--	--
			Benzo(b)fluoranthene	5E-07	2E-07	--	6E-07	--	--	--	--	--
			Dibenz(a,h)anthracene	1E-07	3E-08	--	1E-07	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1E-07	4E-08	--	2E-07	--	--	--	--	--
			Pesticides									
			Dieldrin	9E-08	3E-08	--	1E-07	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	2E-07	7E-08	--	2E-07	--	--	--	--	--
			Aroclor 1260	**7E-05**	**3E-05**	--	**1E-04**	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	**4E-06**	4E-07	--	**5E-06**	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	**2E-06**	2E-07	--	**2E-06**	--	--	--	--	--
			Metals (Total)									
			Aluminum	--	--	--	--	--	--	--	--	--
			Antimony	--	--	--	--	--	--	--	--	--
			Arsenic	**2E-05**	**2E-06**	--	**2E-05**	--	--	--	--	--
			Cadmium (Diet)	--	--	--	--	--	--	--	--	--
			Chromium, Total	**5E-05**	**5E-05**	--	**1E-04**	--	--	--	--	--
			Cobalt	--	--	--	--	--	--	--	--	--
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	--	--	--	--	--
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	**1E-04**	**8E-05**	--	**2E-04**		--	--	--	--
		Exposure Point Total					**2E-04**					--
Exposure Medium Total							**2E-04**					--
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	2E-11	2E-11	--	--	--	--	--
			Benzo(a)pyrene	--	--	1E-10	1E-10	--	--	--	--	--
			Benzo(b)fluoranthene	--	--	3E-11	3E-11	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	7E-12	7E-12	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	8E-12	8E-12	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	5E-12	5E-12	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	9E-12	9E-12	--	--	--	--	--
			Aroclor 1260	--	--	4E-09	4E-09	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	2E-10	2E-10	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	1E-10	1E-10	--	--	--	--	--

Table A-9.6b
Summary of Chemical Cancer Risks for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Metals (Total)									
			Aluminum	--	--	--	--	--	--	--	--	--
			Antimony	--	--	--	--	--	--	--	--	--
			Arsenic	--	--	1E-08	1E-08	--	--	--	--	--
			Cadmium (Diet)	--	--	2E-10	2E-10	--	--	--	--	--
			Chromium, Total	--	--	9E-07	9E-07	--	--	--	--	--
			Cobalt	--	--	2E-08	2E-08	--	--	--	--	--
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	--	--	--	--	--
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	9E-07	9E-07		--	--	--	--
		Exposure Point Total					9E-07					--
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	4E-09	4E-09	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	4E-08	4E-08	--	--	--	--	--
			Aroclor 1260	--	--	**1E-05**	**1E-05**	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	1E-07	1E-07	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	6E-08	6E-08	--	--	--	--	--
			Chemical Total	--	--	**1E-05**	**1E-05**		--	--	--	--
		Exposure Point Total					**1E-05**					--
	Exposure Medium Total						**1E-05**					--
Medium Total							**2E-04**					--
Notes:						**Receptor Risk Total**	**2E-04**				**Receptor Hazard Index (HI)**	--

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table A-9.7
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Adult) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	0 - 0.5 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	--	--	DV	0.00007	0.00004	--	0.0001
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.007	0.0009	--	0.008
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.005	0.0007	--	0.006
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.002	0.00006	--	0.002
			Arsenic	--	--	--	--	CV; DM	0.003	0.0006	--	0.004
			Chromium, Total	--	--	--	--	N/A	0.0007	0.001	--	0.002
			Cobalt	--	--	--	--	EN	0.007	0.0003	--	0.007
			Iron	--	--	--	--	GI	0.006	0.0003	--	0.007
			Manganese (Non-Diet)	--	--	--	--	NV	0.004	0.004	--	0.007
			Thallium	--	--	--	--	DM	0.003	0.0001	--	0.003
			Chemical Total	--	--	--	--		**0.04**	**0.008**	--	**0.05**
		Exposure Point Total					--					**0.05**
	Exposure Medium Total						--					**0.05**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	--	--	DV	--	--	0.0000009	0.0000009
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.00000001	0.00000001
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.000000008	0.000000008
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.00003	0.00003
			Arsenic	--	--	--	--	CV; DM; DV; NV; RP; RS	--	--	0.000009	0.000009
			Chromium, Total	--	--	--	--	RS	--	--	0.000002	0.000002
			Cobalt	--	--	--	--	RS	--	--	0.00003	0.00003
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.0001	0.0001
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	--	--		--	--	**0.0002**	**0.0002**
		Exposure Point Total					--					**0.0002**

Table A-9.7
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Adult) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
		Vapors above Site										
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.000005	0.000005
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.000004	0.000004
			Chemical Total	--	--	--	--		--	--	**0.000009**	**0.000009**
		Exposure Point Total					--					**0.000009**
	Exposure Medium Total						--					**0.0002**
Medium Total							--					**0.05**
Notes:						**Receptor Risk Total**	--				**Receptor Hazard Index (HI)**	**0.05**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.004**
Total Dermal (DM) HI across All Media =	**0.006**
Total Developmental (DV) HI across All Media =	**0.01**
Total Endocrine (EN) HI across All Media =	**0.02**
Total Gastrointestinal (GI) HI across All Media =	**0.007**
Total Hematological (HM) HI across All Media =	**0.000009**
Total Hepatic (HP) HI across All Media =	**0.000009**
Total Nervous (NV) HI across All Media =	**0.009**
Total Reproductive (RP) HI across All Media =	**0.01**
Total Respiratory (RS) HI across All Media =	**0.00005**

Table A-9.8
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Child) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	0 - 0.5 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	--	--	DV	0.0007	0.0002	--	0.0009
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.08	0.006	--	0.08
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.06	0.004	--	0.06
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.02	0.0004	--	0.02
			Arsenic	--	--	--	--	CV; DM	0.03	0.004	--	0.04
			Chromium, Total	--	--	--	--	N/A	0.008	0.008	--	0.02
			Cobalt	--	--	--	--	EN	0.07	0.002	--	0.07
			Iron	--	--	--	--	GI	0.07	0.002	--	0.07
			Manganese (Non-Diet)	--	--	--	--	NV	0.04	0.02	--	0.06
			Thallium	--	--	--	--	DM	0.03	0.0006	--	0.03
			Chemical Total	--	--	--	--		**0.4**	**0.05**	--	**0.4**
		Exposure Point Total					--					**0.4**
	Exposure Medium Total						--					**0.4**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	--	--	DV	--	--	0.0000009	0.0000009
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.00000001	0.00000001
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.000000008	0.000000008
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.00003	0.00003
			Arsenic	--	--	--	--	CV; DM; DV; NV; RP; RS	--	--	0.000009	0.000009
			Chromium, Total	--	--	--	--	RS	--	--	0.000002	0.000002
			Cobalt	--	--	--	--	RS	--	--	0.00003	0.00003
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.0001	0.0001
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	--	--		--	--	**0.0002**	**0.0002**
		Exposure Point Total					--					**0.0002**

Table A-9.8
Summary of Chemical Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Child) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk [2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
		Vapors above Site										
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	--	--	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.000005	0.000005
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.000004	0.000004
			Chemical Total	**--**	**--**	**--**	**--**		**--**	**--**	**0.000009**	**0.000009**
		Exposure Point Total					**--**					**0.000009**
	Exposure Medium Total						**--**					**0.0002**
Medium Total							**--**					**0.4**
Notes:						**Receptor Risk Total**	**--**				**Receptor Hazard Index (HI)**	**0.4**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.04**
Total Dermal (DM) HI across All Media =	**0.06**
Total Developmental (DV) HI across All Media =	**0.1**
Total Endocrine (EN) HI across All Media =	**0.2**
Total Gastrointestinal (GI) HI across All Media =	**0.07**
Total Hematological (HM) HI across All Media =	**0.000009**
Total Hepatic (HP) HI across All Media =	**0.000009**
Total Nervous (NV) HI across All Media =	**0.08**
Total Reproductive (RP) HI across All Media =	**0.1**
Total Respiratory (RS) HI across All Media =	**0.00005**

Table A-9.9
Summary of Chemical Cancer Risks for COPCs
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Lifetime) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Recreator
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	0 - 0.5 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	1E-07	4E-08	--	1E-07	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	7E-07	3E-07	--	1E-06	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	8E-07	7E-08	--	9E-07	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	6E-07	5E-08	--	6E-07	--	--	--	--	--
			Metals (Total)									
			Aluminum	--	--	--	--	--	--	--	--	--
			Arsenic	2E-06	2E-07	--	2E-06	--	--	--	--	--
			Chromium, Total	6E-06	6E-06	--	1E-05	--	--	--	--	--
			Cobalt	--	--	--	--	--	--	--	--	--
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	--	--	--	--	--
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	1E-05	7E-06	--	2E-05		--	--	--	--
		Exposure Point Total					2E-05					--
	Exposure Medium Total						2E-05					--
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	1E-12	1E-12	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	5E-12	5E-12	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	6E-12	6E-12	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	5E-12	5E-12	--	--	--	--	--
			Metals (Total)									
			Aluminum	--	--	--	--	--	--	--	--	--
			Arsenic	--	--	2E-10	2E-10	--	--	--	--	--
			Chromium, Total	--	--	2E-08	2E-08	--	--	--	--	--
			Cobalt	--	--	6E-10	6E-10	--	--	--	--	--
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	--	--	--	--	--
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	2E-08	2E-08		--	--	--	--
		Exposure Point Total					2E-08					--

Table A-9.9
Summary of Chemical Cancer Risks for COPCs
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Recreator (Lifetime) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Recreator
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
		Vapors above Site										
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	2E-08	2E-08	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	3E-09	3E-09	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	2E-09	2E-09	--	--	--	--	--
			Chemical Total	--	--	**2E-08**	**2E-08**		--	--	--	--
		Exposure Point Total					**2E-08**					--
	Exposure Medium Total						**4E-08**					--
Medium Total							**2E-05**					--
Notes:						**Receptor Risk Total**	**2E-05**				**Receptor Hazard Index (HI)**	--

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table A-9.10
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Trespasser (Adolescent) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Trespasser
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	0 - 0.5 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	2E-09	2E-09	--	4E-09	DV	0.00002	0.00002	--	0.00003
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	2E-08	2E-08	--	4E-08	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	3E-08	5E-09	--	3E-08	DV; EN; RP	0.002	0.0004	--	0.002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	2E-08	4E-09	--	2E-08	DV; EN; RP	0.001	0.0003	--	0.002
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.0004	0.00003	--	0.0004
			Arsenic	5E-08	2E-08	--	7E-08	CV; DM	0.0008	0.0003	--	0.001
			Chromium, Total	1E-07	3E-07	--	5E-07	N/A	0.0002	0.0005	--	0.0007
			Cobalt	--	--	--	--	EN	0.002	0.0001	--	0.002
			Iron	--	--	--	--	GI	0.002	0.0001	--	0.002
			Manganese (Non-Diet)	--	--	--	--	NV	0.0009	0.002	--	0.002
			Thallium	--	--	--	--	DM	0.0007	0.00005	--	0.0007
			Chemical Total	**2E-07**	**4E-07**	**--**	**6E-07**		**0.01**	**0.003**	**--**	**0.01**
		Exposure Point Total					**6E-07**					**0.01**
	Exposure Medium Total						**6E-07**					**0.01**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	--	--	1E-13	1E-13	DV	--	--	0.0000003	0.0000003
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	6E-13	6E-13	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	8E-13	8E-13	DV; EN; HM; HP; RP; RS	--	--	0.000000004	0.000000004
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	5E-13	5E-13	DV; EN; HM; HP; RP; RS	--	--	0.000000003	0.000000003
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.000008	0.000008
			Arsenic	--	--	3E-11	3E-11	CV; DM; DV; NV; RP; RS	--	--	0.000003	0.000003
			Chromium, Total	--	--	2E-09	2E-09	RS	--	--	0.0000006	0.0000006
			Cobalt	--	--	7E-11	7E-11	RS	--	--	0.000009	0.000009
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.00005	0.00005
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	**--**	**--**	**2E-09**	**2E-09**		**--**	**--**	**0.00007**	**0.00007**
		Exposure Point Total					**2E-09**					**0.00007**

Table A-9.10
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Trespasser (Adolescent) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Current/Future
Receptor Population:	On-Site Trespasser
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk [2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
		Vapors above Site										
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	4E-09	4E-09	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	6E-10	6E-10	DV; EN; HM; HP; RP; RS	--	--	0.000003	0.000003
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	4E-10	4E-10	DV; EN; HM; HP; RP; RS	--	--	0.000002	0.000002
			Chemical Total	**--**	**--**	**5E-09**	**5E-09**		**--**	**--**	**0.000005**	**0.000005**
		Exposure Point Total					**5E-09**					**0.000005**
	Exposure Medium Total						**7E-09**					**0.00007**
Medium Total							**6E-07**					**0.01**
Notes:						**Receptor Risk Total**	**6E-07**				**Receptor Hazard Index (HI)**	**0.01**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.001**
Total Dermal (DM) HI across All Media =	**0.002**
Total Developmental (DV) HI across All Media =	**0.004**
Total Endocrine (EN) HI across All Media =	**0.006**
Total Gastrointestinal (GI) HI across All Media =	**0.002**
Total Hematological (HM) HI across All Media =	**0.000005**
Total Hepatic (HP) HI across All Media =	**0.000005**
Total Nervous (NV) HI across All Media =	**0.003**
Total Reproductive (RP) HI across All Media =	**0.004**
Total Respiratory (RS) HI across All Media =	**0.00002**

Table A-9.11a
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Commercial/Industrial Worker - Total Soil (0 - 2 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Commercial/Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 2 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)anthracene	1E-08	6E-09	--	2E-08	--	--	--	--	--
			Benzo(a)pyrene	9E-08	5E-08	--	1E-07	DV	0.0008	0.0005	--	0.001
			Benzo(b)fluoranthene	2E-08	9E-09	--	3E-08	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	5E-09	3E-09	--	8E-09	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	3E-07	2E-07	--	5E-07	DM; IM; OC	0.02	0.01	--	0.04
			Aroclor 1260	1E-06	6E-07	--	2E-06	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	9E-07	1E-07	--	1E-06	DV; EN; RP	0.03	0.003	--	0.03
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	5E-07	7E-08	--	6E-07	DV; EN; RP	0.02	0.002	--	0.02
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.007	0.0003	--	0.008
			Antimony	--	--	--	--	HM; OT	0.002	0.0006	--	0.003
			Arsenic	4E-06	8E-07	--	4E-06	CV; DM	0.02	0.005	--	0.03
			Cadmium (Diet)	--	--	--	--	UR	0.0004	0.00008	--	0.0005
			Chromium, Total	2E-06	4E-06	--	6E-06	N/A	0.004	0.008	--	0.01
			Cobalt	--	--	--	--	EN	0.03	0.001	--	0.03
			Iron	--	--	--	--	GI	0.03	0.001	--	0.03
			Manganese (Non-Diet)	--	--	--	--	NV	0.02	0.02	--	0.04
			Thallium	--	--	--	--	DM	0.01	0.0006	--	0.01
			Chemical Total	9E-06	6E-06	--	1E-05		**0.2**	**0.06**	--	**0.3**
		Exposure Point Total					1E-05					**0.3**
	Exposure Medium Total						1E-05					**0.3**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)anthracene	--	--	1E-12	1E-12	--	--	--	--	--
			Benzo(a)pyrene	--	--	1E-11	1E-11	DV	--	--	0.00002	0.00002
			Benzo(b)fluoranthene	--	--	2E-12	2E-12	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	6E-13	6E-13	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	2E-11	2E-11	--	--	--	--	--
			Aroclor 1260	--	--	5E-11	5E-11	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	5E-11	5E-11	DV; EN; HM; HP; RP; RS	--	--	0.00000009	0.00000009
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	3E-11	3E-11	DV; EN; HM; HP; RP; RS	--	--	0.00000006	0.00000006
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.0003	0.0003
			Antimony	--	--	--	--	RS	--	--	0.0000006	0.0000006
			Arsenic	--	--	3E-09	3E-09	CV; DM; DV; NV; RP; RS	--	--	0.0001	0.0001
			Cadmium (Diet)	--	--	6E-11	6E-11	UR	--	--	0.000009	0.000009
			Chromium, Total	--	--	8E-08	8E-08	RS	--	--	0.00003	0.00003
			Cobalt	--	--	6E-09	6E-09	RS	--	--	0.0003	0.0003
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.002	0.002

Table A-9.11a
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Commercial/Industrial Worker - Total Soil (0 - 2 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Commercial/Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	9E-08	9E-08		--	--	0.002	0.002
		Exposure Point Total					9E-08					0.002
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)anthracene	--	--	2E-10	2E-10	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	8E-08	8E-08	--	--	--	--	--
			Aroclor 1260	--	--	2E-07	2E-07	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	2E-08	2E-08	DV; EN; HM; HP; RP; RS	--	--	0.00004	0.00004
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	1E-08	1E-08	DV; EN; HM; HP; RP; RS	--	--	0.00003	0.00003
			Chemical Total	--	--	3E-07	3E-07		--	--	0.00007	0.00007
		Exposure Point Total					3E-07					0.00007
	Exposure Medium Total						4E-07					0.003
Medium Total							2E-05					0.3
Notes:							**Receptor Risk Total** 2E-05				**Receptor Hazard Index (HI)**	0.3

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	0.03
Total Dermal (DM) HI across All Media =	0.08
Total Developmental (DV) HI across All Media =	0.05
Total Endocrine (EN) HI across All Media =	0.08
Total Gastrointestinal (GI) HI across All Media =	0.03
Total Hematological (HM) HI across All Media =	0.003
Total Hepatic (HP) HI across All Media =	0.00007
Total Immune (IM) HI across All Media =	0.04
Total Nervous (NV) HI across All Media =	0.05
Total Ocular (OC) HI across All Media =	0.04
Total Other (OT) HI across All Media =	0.003
Total Reproductive (RP) HI across All Media =	0.05
Total Respiratory (RS) HI across All Media =	0.0006
Total Urinary (UR) HI across All Media =	0.0005

Table A-9.11b
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Commercial/Industrial Worker - Total Soil (0 - 2 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Commercial/Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 2 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)anthracene	1E-08	6E-09	--	2E-08	--	--	--	--	--
			Benzo(a)pyrene	9E-08	5E-08	--	1E-07	DV	0.0008	0.0005	--	0.001
			Benzo(b)fluoranthene	2E-08	9E-09	--	3E-08	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	5E-09	3E-09	--	8E-09	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	3E-07	2E-07	--	5E-07	DM; IM; OC	0.02	0.01	--	0.04
			Aroclor 1260	1E-05	9E-06	--	2E-05	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	9E-07	1E-07	--	1E-06	DV; EN; RP	0.03	0.003	--	0.03
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	5E-07	7E-08	--	6E-07	DV; EN; RP	0.02	0.002	--	0.02
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.007	0.0003	--	0.008
			Antimony	--	--	--	--	HM; OT	0.002	0.0006	--	0.003
			Arsenic	4E-06	8E-07	--	4E-06	CV; DM	0.02	0.005	--	0.03
			Cadmium (Diet)	--	--	--	--	UR	0.0004	0.00008	--	0.0005
			Chromium, Total	2E-06	4E-06	--	6E-06	N/A	0.004	0.008	--	0.01
			Cobalt	--	--	--	--	EN	0.03	0.001	--	0.03
			Iron	--	--	--	--	GI	0.03	0.001	--	0.03
			Manganese (Non-Diet)	--	--	--	--	NV	0.02	0.02	--	0.04
			Thallium	--	--	--	--	DM	0.01	0.0006	--	0.01
			Chemical Total	2E-05	1E-05	--	4E-05		**0.2**	**0.06**	--	**0.3**
		Exposure Point Total					4E-05					**0.3**
	Exposure Medium Total						4E-05					**0.3**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)anthracene	--	--	1E-12	1E-12	--	--	--	--	--
			Benzo(a)pyrene	--	--	1E-11	1E-11	DV	--	--	0.00002	0.00002
			Benzo(b)fluoranthene	--	--	2E-12	2E-12	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	6E-13	6E-13	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	2E-11	2E-11	--	--	--	--	--
			Aroclor 1260	--	--	8E-10	8E-10	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	5E-11	5E-11	DV; EN; HM; HP; RP; RS	--	--	0.00000009	0.00000009
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	3E-11	3E-11	DV; EN; HM; HP; RP; RS	--	--	0.00000006	0.00000006
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.0003	0.0003
			Antimony	--	--	--	--	RS	--	--	0.0000006	0.0000006
			Arsenic	--	--	3E-09	3E-09	CV; DM; DV; NV; RP; RS	--	--	0.0001	0.0001
			Cadmium (Diet)	--	--	6E-11	6E-11	UR	--	--	0.000009	0.000009
			Chromium, Total	--	--	8E-08	8E-08	RS	--	--	0.00003	0.00003
			Cobalt	--	--	6E-09	6E-09	RS	--	--	0.0003	0.0003
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.002	0.002

Table A-9.11b
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Commercial/Industrial Worker - Total Soil (0 - 2 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Commercial/Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	9E-08	9E-08		--	--	0.002	0.002
		Exposure Point Total					9E-08					0.002
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)anthracene	--	--	2E-10	2E-10	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	8E-08	8E-08	--	--	--	--	--
			Aroclor 1260	--	--	**3E-06**	**3E-06**	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	2E-08	2E-08	DV; EN; HM; HP; RP; RS	--	--	0.00004	0.00004
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	1E-08	1E-08	DV; EN; HM; HP; RP; RS	--	--	0.00003	0.00003
			Chemical Total	--	--	**3E-06**	**3E-06**		--	--	**0.00007**	**0.00007**
		Exposure Point Total					**3E-06**					**0.00007**
	Exposure Medium Total						**3E-06**					**0.003**
Medium Total							**4E-05**					**0.3**
Notes:						**Receptor Risk Total**	**4E-05**				**Receptor Hazard Index (HI)**	**0.3**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.03**
Total Dermal (DM) HI across All Media =	**0.08**
Total Developmental (DV) HI across All Media =	**0.05**
Total Endocrine (EN) HI across All Media =	**0.08**
Total Gastrointestinal (GI) HI across All Media =	**0.03**
Total Hematological (HM) HI across All Media =	**0.003**
Total Hepatic (HP) HI across All Media =	**0.00007**
Total Immune (IM) HI across All Media =	**0.04**
Total Nervous (NV) HI across All Media =	**0.05**
Total Ocular (OC) HI across All Media =	**0.04**
Total Other (OT) HI across All Media =	**0.003**
Total Reproductive (RP) HI across All Media =	**0.05**
Total Respiratory (RS) HI across All Media =	**0.0006**
Total Urinary (UR) HI across All Media =	**0.0005**

Table A-9.12a
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 8.8 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	EN	0.01	0.004	--	0.02
			Benzo(a)anthracene	2E-09	9E-10	--	3E-09	--	--	--	--	--
			Benzo(a)pyrene	1E-08	6E-09	--	2E-08	DV	0.003	0.001	--	0.005
			Benzo(b)fluoranthene	3E-09	1E-09	--	4E-09	--	--	--	--	--
			Dibenz(a,h)anthracene	6E-10	3E-10	--	9E-10	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	7E-10	3E-10	--	1E-09	--	--	--	--	--
			Pesticides									
			Dieldrin	3E-09	8E-10	--	3E-09	HP	0.0002	0.00007	--	0.0003
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	5E-09	2E-09	--	7E-09	NV	0.006	0.003	--	0.008
			Aroclor 1260	1E-07	4E-08	--	1E-07	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	1E-07	1E-08	--	1E-07	IM	0.003	0.0003	--	0.004
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	6E-08	6E-09	--	7E-08	IM	0.002	0.0002	--	0.002
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.02	0.0008	--	0.02
			Antimony	--	--	--	--	OT	0.007	0.001	--	0.008
			Arsenic	4E-07	7E-08	--	5E-07	DM	0.004	0.0007	--	0.005
			Cadmium (Diet)	--	--	--	--	MS	0.002	0.0002	--	0.002
			Chromium, Total	3E-07	4E-07	--	7E-07	HM	0.008	0.01	--	0.02
			Cobalt	--	--	--	--	EN	0.01	0.0003	--	0.01
			Iron	--	--	--	--	GI	0.09	0.003	--	0.09
			Manganese (Non-Diet)	--	--	--	--	NV	0.05	0.04	--	0.09
			Thallium	--	--	--	--	DM	0.01	0.0003	--	0.01
			Chemical Total	**1E-06**	**5E-07**	**--**	**2E-06**		**0.2**	**0.07**	**--**	**0.3**
		Exposure Point Total					**2E-06**					**0.3**
	Exposure Medium Total						**2E-06**					**0.3**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	1E-11	1E-11	--	--	--	--	--
			Benzo(a)pyrene	--	--	9E-11	9E-11	DV	--	--	0.005	0.005
			Benzo(b)fluoranthene	--	--	2E-11	2E-11	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	4E-12	4E-12	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	5E-12	5E-12	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	8E-12	8E-12	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	2E-11	2E-11	--	--	--	--	--
			Aroclor 1260	--	--	3E-10	3E-10	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	4E-10	4E-10	DV; EN; HM; HP; RP; RS	--	--	0.00002	0.00002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	2E-10	2E-10	DV; EN; HM; HP; RP; RS	--	--	0.000009	0.000009

Table A-9.12a
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.05	0.05
			Antimony	--	--	--	--	RS	--	--	0.00003	0.00003
			Arsenic	--	--	2E-08	2E-08	CV; DM; DV; NV; RP; RS	--	--	0.02	0.02
			Cadmium (Diet)	--	--	3E-10	3E-10	UR	--	--	0.00001	0.00001
			Chromium, Total	--	--	5E-07	5E-07	RS	--	--	0.001	0.001
			Cobalt	--	--	4E-08	4E-08	RS	--	--	0.02	0.02
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.3	0.3
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	--	--	6E-07	6E-07		--	--	0.4	0.4
		Exposure Point Total					6E-07					0.4
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	5E-11	5E-11	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	1E-09	1E-09	--	--	--	--	--
			Aroclor 1260	--	--	2E-08	2E-08	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	4E-09	4E-09	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	2E-09	2E-09	DV; EN; HM; HP; RP; RS	--	--	0.00009	0.00009
			Chemical Total	--	--	3E-08	3E-08		--	--	0.0003	0.0003
		Exposure Point Total					3E-08					0.0003
	Exposure Medium Total						6E-07					0.4
Medium Total							2E-06					0.6
Notes:						Receptor Risk Total	2E-06				Receptor Hazard Index (HI)	0.6

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.02**
Total Dermal (DM) HI across All Media =	**0.04**
Total Developmental (DV) HI across All Media =	**0.03**
Total Endocrine (EN) HI across All Media =	**0.03**
Total Gastrointestinal (GI) HI across All Media =	**0.09**
Total Hematological (HM) HI across All Media =	**0.02**
Total Hepatic (HP) HI across All Media =	**0.0006**
Total Immune (IM) HI across All Media =	**0.005**
Total Musculoskeletal (MS) HI across All Media =	**0.002**
Total Nervous (NV) HI across All Media =	**0.5**
Total Other (OT) HI across All Media =	**0.008**
Total Reproductive (RP) HI across All Media =	**0.02**
Total Respiratory (RS) HI across All Media =	**0.04**
Total Urinary (UR) HI across All Media =	**0.00001**

Table A-9.12b
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1]				
				Carcinogenic Risk [2]				Non-Carcinogenic Hazard Quotient [2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 8.8 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	EN	0.01	0.004	--	0.02
			Benzo(a)anthracene	2E-09	9E-10	--	3E-09	--	--	--	--	--
			Benzo(a)pyrene	1E-08	6E-09	--	2E-08	DV	0.003	0.001	--	0.005
			Benzo(b)fluoranthene	3E-09	1E-09	--	4E-09	--	--	--	--	--
			Dibenz(a,h)anthracene	6E-10	3E-10	--	9E-10	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	7E-10	3E-10	--	1E-09	--	--	--	--	--
			Pesticides									
			Dieldrin	3E-09	8E-10	--	3E-09	HP	0.0002	0.00007	--	0.0003
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	5E-09	2E-09	--	7E-09	NV	0.006	0.003	--	0.008
			Aroclor 1260	2E-06	9E-07	--	3E-06	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	1E-07	1E-08	--	1E-07	IM	0.003	0.0003	--	0.004
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	6E-08	6E-09	--	7E-08	IM	0.002	0.0002	--	0.002
			Metals (Total)									
			Aluminum	--	--	--	--	NV	0.02	0.0008	--	0.02
			Antimony	--	--	--	--	OT	0.007	0.001	--	0.008
			Arsenic	4E-07	7E-08	--	5E-07	DM	0.004	0.0007	--	0.005
			Cadmium (Diet)	--	--	--	--	MS	0.002	0.0002	--	0.002
			Chromium, Total	3E-07	4E-07	--	7E-07	HM	0.008	0.01	--	0.02
			Cobalt	--	--	--	--	EN	0.01	0.0003	--	0.01
			Iron	--	--	--	--	GI	0.09	0.003	--	0.09
			Manganese (Non-Diet)	--	--	--	--	NV	0.05	0.04	--	0.09
			Thallium	--	--	--	--	DM	0.01	0.0003	--	0.01
			Chemical Total	**3E-06**	**1E-06**	**--**	**4E-06**		**0.2**	**0.07**	**--**	**0.3**
		Exposure Point Total					**4E-06**					**0.3**
	Exposure Medium Total						**4E-06**					**0.3**
	Outdoor Air	Particulates above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	1E-11	1E-11	--	--	--	--	--
			Benzo(a)pyrene	--	--	9E-11	9E-11	DV	--	--	0.005	0.005
			Benzo(b)fluoranthene	--	--	2E-11	2E-11	--	--	--	--	--
			Dibenz(a,h)anthracene	--	--	4E-12	4E-12	--	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	5E-12	5E-12	--	--	--	--	--
			Pesticides									
			Dieldrin	--	--	8E-12	8E-12	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	2E-11	2E-11	--	--	--	--	--
			Aroclor 1260	--	--	6E-09	6E-09	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	4E-10	4E-10	DV; EN; HM; HP; RP; RS	--	--	0.00002	0.00002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	2E-10	2E-10	DV; EN; HM; HP; RP; RS	--	--	0.000009	0.000009

Table A-9.12b
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Construction Worker - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)[1] Carcinogenic Risk[2]				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)[1] Non-Carcinogenic Hazard Quotient[2]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
			Metals (Total)									
			Aluminum	--	--	--	--	NV	--	--	0.05	0.05
			Antimony	--	--	--	--	RS	--	--	0.00003	0.00003
			Arsenic	--	--	2E-08	2E-08	CV; DM; DV; NV; RP; RS	--	--	0.02	0.02
			Cadmium (Diet)	--	--	3E-10	3E-10	UR	--	--	0.00001	0.00001
			Chromium, Total	--	--	5E-07	5E-07	RS	--	--	0.001	0.001
			Cobalt	--	--	4E-08	4E-08	RS	--	--	0.02	0.02
			Iron	--	--	--	--	--	--	--	--	--
			Manganese (Non-Diet)	--	--	--	--	NV	--	--	0.3	0.3
			Thallium	--	--	--	--	--	--	--	--	--
			Chemical Total	**--**	**--**	**6E-07**	**6E-07**		**--**	**--**	**0.4**	**0.4**
		Exposure Point Total					**6E-07**					**0.4**
		Vapors above Site										
			Semi-volatile Organic Compounds (SVOCs)									
			1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	--	--	--
			Benzo(a)anthracene	--	--	5E-11	5E-11	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1254	--	--	1E-09	1E-09	--	--	--	--	--
			Aroclor 1260	--	--	5E-07	5E-07	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	--	--	4E-09	4E-09	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	2E-09	2E-09	DV; EN; HM; HP; RP; RS	--	--	0.00009	0.00009
			Chemical Total	**--**	**--**	**5E-07**	**5E-07**		**--**	**--**	**0.0003**	**0.0003**
		Exposure Point Total					**5E-07**					**0.0003**
	Exposure Medium Total						**1E-06**					**0.4**
Medium Total							**5E-06**					**0.6**
Notes:						**Receptor Risk Total**	**5E-06**				**Receptor Hazard Index (HI)**	**0.6**

(1) Exceedances of the carcinogenic and non-carcinogenic identified above are indicated (if applicable) with **red bold text**.

(2) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Total Cardiovascular (CV) HI across All Media =	**0.02**
Total Dermal (DM) HI across All Media =	**0.04**
Total Developmental (DV) HI across All Media =	**0.03**
Total Endocrine (EN) HI across All Media =	**0.03**
Total Gastrointestinal (GI) HI across All Media =	**0.09**
Total Hematological (HM) HI across All Media =	**0.02**
Total Hepatic (HP) HI across All Media =	**0.0006**
Total Immune (IM) HI across All Media =	**0.005**
Total Musculoskeletal (MS) HI across All Media =	**0.002**
Total Nervous (NV) HI across All Media =	**0.5**
Total Other (OT) HI across All Media =	**0.008**
Total Reproductive (RP) HI across All Media =	**0.02**
Total Respiratory (RS) HI across All Media =	**0.04**
Total Urinary (UR) HI across All Media =	**0.00001**

Table A-10.1
Risk Summary
Reasonable Maximum Exposure (Site-Wide)
Current/Future On-Site Hypothetical Resident (Child) - Surface Soil (0 - 0.5 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)				
				Carcinogenic Risk [1]				Non-Carcinogenic Hazard Quotient [1]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	0 - 0.5 feet	**Polychlorinated Biphenyls (PCBs) - Congeners**									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.5	0.04	--	0.6
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; RP	0.4	0.03	--	0.4
			Metals (Total)									
			Cobalt	--	--	--	--	EN	0.5	0.01	--	0.5
			Chemical Total	**--**	**--**	**--**	**--**		**1**	**0.08**	**--**	**2**
		Exposure Point Total					**--**					**2**
	Exposure Medium Total						**--**					**2**
	Outdoor Air	Particulates above Site	**Polychlorinated Biphenyls (PCBs) - Congeners**									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000005	0.0000005
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0000004	0.0000004
			Chemical Total	**--**	**--**	**--**	**--**		**--**	**--**	**0.0000009**	**0.0000009**
		Exposure Point Total					**--**					**0.0000009**
		Vapors above Site	**Polychlorinated Biphenyls (PCBs) - Congeners**									
			PCBC TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	--	--	--	--	DV; EN; HM; HP; RP; RS	--	--	0.0002	0.0002
			Chemical Total	**--**	**--**	**--**	**--**		**--**	**--**	**0.0004**	**0.0004**
		Exposure Point Total					**--**					**0.0004**
	Exposure Medium Total						**--**					**0.0004**
Medium Total							**--**					**2**
Notes:						**Receptor Risk Total**	**--**				**Receptor Hazard Index (HI)**	**2**

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Thresholds were used to determine which chemical/pathway specific exposure routes would be evaluated in the RAGS Table 10s. For carcinogenic risk, chemical/pathway specific exposure routes with a risk greater than 1E-06 were evaluated. For non-carcinogenic hazard, the target organ HIs greater than 1 from the RAGS Table 9s were evaluated in the RAGS Table 10s.

Total Cardiovascular (CV) HI across All Media =	**--**
Total Dermal (DM) HI across All Media =	**--**
Total Developmental (DV) HI across All Media =	**1**
Total Endocrine (EN) HI across All Media =	**2**
Total Gastrointestinal (GI) HI across All Media =	**--**
Total Hematological (HM) HI across All Media =	**0.0004**
Total Hepatic (HP) HI across All Media =	**0.0004**
Total Nervous (NV) HI across All Media =	**--**
Total Reproductive (RP) HI across All Media =	**1**
Total Respiratory (RS) HI across All Media =	**0.0004**

Table A-10.2
Risk Summary
Reasonable Maximum Exposure (Site-Wide with Hotspot)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil (0 - 8.8 feet)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Scenario Timeframe:	Future
Receptor Population:	On-Site Hypothetical Resident
Receptor Age:	Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04)				Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1)				
				Carcinogenic Risk [1]				Non-Carcinogenic Hazard Quotient [1]				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organs	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Total Soil	0 - 8.8 feet										
			Semi-volatile Organic Compounds (SVOCs)									
			Benzo(a)pyrene	2E-06	--	--	2E-06	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	7E-05	3E-05	--	1E-04	--	--	--	--	--
			Polychlorinated Biphenyls (PCBs) - Congeners									
			PCBC TEQ MAMMAL HALFND	4E-06	--	--	4E-06	--	--	--	--	--
			Dioxins and Furans									
			DIOXIN TEQ MAMMAL HALFND	2E-06	--	--	2E-06	--	--	--	--	--
			Metals (Total)									
			Arsenic	2E-05	2E-06	--	2E-05	--	--	--	--	--
			Chromium, Total	5E-05	5E-05	--	1E-04	--	--	--	--	--
			Chemical Total	1E-04	8E-05	--	2E-04		--	--	--	--
		Exposure Point Total					2E-04					--
	Exposure Medium Total						2E-04					--
	Outdoor Air	Vapors above Site										
			Polychlorinated Biphenyls (PCBs)									
			Aroclor 1260	--	--	1E-05	1E-05	--	--	--	--	--
			Chemical Total	--	--	1E-05	1E-05		--	--	--	--
		Exposure Point Total					1E-05					--
	Exposure Medium Total						1E-05					--
Medium Total							2E-04					--
Notes:						**Receptor Risk Total**	2E-04				**Receptor Hazard Index (HI)**	--

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Thresholds were used to determine which chemical/pathway specific exposure routes would be evaluated in the RAGS Table 10s. For carcinogenic risk, chemical/pathway specific exposure routes with a risk greater than 1E-06 were evaluated. For non-carcinogenic hazard, the target organ HIs greater than 1 from the RAGS Table 9s were evaluated in the RAGS Table 10s.

APPENDIX B

Table B-1
List of Samples Used in the HHRA
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Sample Location	Sample Name	Date	Sample Code[(1)]	Depth (ft bgs)	Vertical Unit
SB403	SB403-0006	7/16/2021	N	0 - 0.5	Surface Soil
SB403	SB403-0624	7/16/2021	N	0.5 - 2	Near Surface Soil
SB403	SB403-2448	7/16/2021	N	2 - 4	Subsurface Soil
SB404	SB404-0006	7/16/2021	N	0 - 0.5	Surface Soil
SB404	SB404-0624	7/16/2021	N	0.5 - 2	Near Surface Soil
SB404	SB404-2448	7/16/2021	N	2 - 4	Subsurface Soil
SB405	SB405-0006	7/15/2021	N	0 - 0.5	Surface Soil
SB405	SB405-0624	7/15/2021	N	0.5 - 2	Near Surface Soil
SB405	SB405-2448	7/15/2021	N	2 - 4	Subsurface Soil
SB406	SB406-0006	7/15/2021	N	0 - 0.5	Surface Soil
SB406	SB406-0624	7/15/2021	N	0.5 - 2	Near Surface Soil
SB406	SB406-2448	7/15/2021	N	2 - 4	Subsurface Soil
SB407	SB407-0006	7/15/2021	N	0 - 0.5	Surface Soil
SB407	SB407-0624	7/15/2021	N	0.5 - 2	Near Surface Soil
SB407	SB407-2448	7/15/2021	N	2 - 4	Subsurface Soil
SB408	SB408-0006	7/16/2021	N	0 - 0.5	Surface Soil
SB408	SB408-0624	7/16/2021	N	0.5 - 2	Near Surface Soil
SB408	SB408-2448	7/16/2021	N	2 - 4	Subsurface Soil
SB450	SB450-0006	7/15/2021	N	0 - 0.5	Surface Soil
SB450	SB450-0624	7/15/2021	N	0.5 - 2	Near Surface Soil
SB450	SB450-2448	7/15/2021	N	2 - 4	Subsurface Soil
SB451	SB451-0006	7/15/2021	N	0 - 0.5	Surface Soil
SB451	071521-FD-03	7/15/2021	FD	0 - 0.5	Surface Soil
SB451	SB451-0624	7/15/2021	N	0.5 - 2	Near Surface Soil
SB451	SB451-2448	7/15/2021	N	2 - 4	Subsurface Soil
SB452	SB452-0006	7/15/2021	N	0 - 0.5	Surface Soil
SB452	SB452-0624	7/15/2021	N	0.5 - 2	Near Surface Soil
SB452	SB452-2448	7/15/2021	N	2 - 4	Subsurface Soil
SA-SB310	SB310-20191107-0006	11/7/2019	N	0 - 0.5	Surface Soil
SA-SB310	SB310-20191107-0624	11/7/2019	N	0.5 - 2	Near Surface Soil
SA-SB310	SB310-20191107-2448	11/7/2019	N	2 - 4	Subsurface Soil
SA-SB310	SB310-20191107-2448-D	11/7/2019	FD	2 - 4	Subsurface Soil
SA-SB310	SB310-20191107-4872	11/7/2019	N	4 - 6	Subsurface Soil
SA-SB311	SB311-20191107-0006	11/7/2019	N	0 - 0.5	Surface Soil
SA-SB311	SB311-20191107-0624	11/7/2019	N	0.5 - 2	Near Surface Soil
SA-SB311	SB311-20191107-2448	11/7/2019	N	2 - 4	Subsurface Soil
SA-SB311	SB311-20191107-4872	11/7/2019	N	4 - 6	Subsurface Soil
SA-SB312	SB312-20191107-0006	11/7/2019	N	0 - 0.5	Surface Soil
SA-SB312	SB312-20191107-0624	11/7/2019	N	0.5 - 2	Near Surface Soil
SA-SB312	SB312-20191107-2448	11/7/2019	N	2 - 4	Subsurface Soil
SA-SB312	SB312-20191107-4872	11/7/2019	N	4 - 6	Subsurface Soil
SA-SB313	SB313-20191107-0006	11/7/2019	N	0 - 0.5	Surface Soil
SA-SB313	SB313-20191107-0624	11/7/2019	N	0.5 - 2	Near Surface Soil
SA-SB313	SB313-20191107-2448	11/7/2019	N	2 - 4	Subsurface Soil
SA-SB313	SB313-20191107-4872	11/7/2019	N	4 - 6	Subsurface Soil
SA-SB314	SB314-20191107-0006	11/7/2019	N	0 - 0.5	Surface Soil

Table B-1
List of Samples Used in the HHRA
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Sample Location	Sample Name	Date	Sample Code[(1)]	Depth (ft bgs)	Vertical Unit
SA-SB314	SB314-20191107-0624	11/7/2019	N	0.5 - 2	Near Surface Soil
SA-SB314	SB314-20191107-2448	11/7/2019	N	2 - 4	Subsurface Soil
SA-SB314	SB314-20191107-4872	11/7/2019	N	4 - 6	Subsurface Soil
SA-SB315	SB315-20191107-0006	11/7/2019	N	0 - 0.5	Surface Soil
SA-SB315	SB315-20191107-0624	11/7/2019	N	0.5 - 2	Near Surface Soil
SA-SB315	SB315-20191107-2448	11/7/2019	N	2 - 4	Subsurface Soil
SA-SB315	SB315-20191107-7296	11/7/2019	N	6 - 8	Subsurface Soil
SA-SB316	SB316-20191108-0006	11/8/2019	N	0 - 0.5	Surface Soil
SA-SB316	SB316-20191108-0624	11/8/2019	N	0.5 - 2	Near Surface Soil
SA-SB316	SB316-20191108-0624-D	11/8/2019	FD	0.5 - 2	Near Surface Soil
SA-SB316	SB316-20191108-2448	11/8/2019	N	2 - 4	Subsurface Soil
SA-SB316	SB316-20191108-6084	11/8/2019	N	5 - 7	Subsurface Soil
SA-SB317	SB317-20191108-0006	11/8/2019	N	0 - 0.5	Surface Soil
SA-SB317	SB317-20191108-0624	11/8/2019	N	0.5 - 2	Near Surface Soil
SA-SB317	SB317-20191108-6084	11/8/2019	N	5 - 7	Subsurface Soil
SA-SB318	SB318-20191108-0006	11/8/2019	N	0 - 0.5	Surface Soil
SA-SB318	SB318-20191108-0624	11/8/2019	N	0.5 - 2	Near Surface Soil
SA-SB318	SB318-20191108-2448	11/8/2019	N	2 - 4	Subsurface Soil
SA-SB318	SB318-20191108-4872	11/8/2019	N	4 - 6	Subsurface Soil
SA-SB319	SB319-20191107-0006	11/7/2019	N	0 - 0.5	Surface Soil
SA-SB319	SB319-20191107-0624	11/7/2019	N	0.5 - 2	Near Surface Soil
SA-SB319	SB319-20191107-6084	11/7/2019	N	5 - 7	Subsurface Soil
SA-SB320	SB320-20191125-0006	11/25/2019	N	0 - 0.5	Surface Soil
SA-SB320	SB320-20191125-0624	11/25/2019	N	0.5 - 2	Near Surface Soil
SA-SB320	SB320-20191125-2448	11/25/2019	N	2 - 4	Subsurface Soil
SA-SB320	SB320-20191125-6084	11/25/2019	N	5 - 7	Subsurface Soil
SA-SB321	SB321-20191125-0006	11/25/2019	N	0 - 0.5	Surface Soil
SA-SB321	SB321-20191125-0624	11/25/2019	N	0.5 - 2	Near Surface Soil
SA-SB321	SB321-20191125-2448	11/25/2019	N	2 - 4	Subsurface Soil
SA-SB321	SB321-20191125-6084	11/25/2019	N	5 - 7	Subsurface Soil
SA-SB322	SB322-20191122-0006	11/22/2019	N	0 - 0.5	Surface Soil
SA-SB322	SB322-20191122-0624	11/22/2019	N	0.5 - 2	Near Surface Soil
SA-SB322	SB322-20191122-2448	11/22/2019	N	2 - 4	Subsurface Soil
SA-SB322	SB322-20191122-4872	11/22/2019	N	4 - 6	Subsurface Soil
SA-SB323	SB323-20191122-0006	11/22/2019	N	0 - 0.5	Surface Soil
SA-SB323	SB323-20191122-0624	11/22/2019	N	0.5 - 2	Near Surface Soil
SA-SB323	SB323-20191122-0624-RE	11/22/2019	N	0.5 - 2	Near Surface Soil
SA-SB323	SB323-20191122-4872	11/22/2019	N	4 - 6	Subsurface Soil
SA-SB323	SB323-20191122-7296	11/22/2019	N	6 - 8	Subsurface Soil
SA-SB324	SB324-20191122-0006	11/22/2019	N	0 - 0.5	Surface Soil
SA-SB324	SB324-20191122-0624	11/22/2019	N	0.5 - 2	Near Surface Soil
SA-SB324	SB324-20191122-2448	11/22/2019	N	2 - 4	Subsurface Soil
SA-SB324	SB324-20191122-6084	11/22/2019	N	5 - 7	Subsurface Soil
SA-SB325	SB325-20191122-0006	11/22/2019	N	0 - 0.5	Surface Soil
SA-SB325	SB325-20191122-0006-D	11/22/2019	FD	0 - 0.5	Surface Soil
SA-SB325	SB325-20191122-0624	11/22/2019	N	0.5 - 2	Near Surface Soil

Table B-1
List of Samples Used in the HHRA
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Sample Location	Sample Name	Date	Sample Code[(1)]	Depth (ft bgs)	Vertical Unit
SA-SB325	SB325-20191122-6084	11/22/2019	N	5 - 7	Subsurface Soil
SA-SB325	SB325-20191122-84106	11/22/2019	N	7 - 8.8	Subsurface Soil
SA-SB326	SB326-20191115-0006	11/15/2019	N	0 - 0.5	Surface Soil
SA-SB326	SB326-20191115-0624	11/15/2019	N	0.5 - 2	Near Surface Soil
SA-SB326	SB326-20191115-2448	11/15/2019	N	2 - 4	Subsurface Soil
SA-SB326	SB326-20191115-4872	11/15/2019	N	4 - 6	Subsurface Soil
SA-SB327	SB327-20191115-0006	11/15/2019	N	0 - 0.5	Surface Soil
SA-SB327	SB327-20191115-0624	11/15/2019	N	0.5 - 2	Near Surface Soil
SA-SB327	SB327-20191115-2448	11/15/2019	N	2 - 4	Subsurface Soil
SA-SB327	SB327-20191115-7296	11/15/2019	N	6 - 8	Subsurface Soil
SA-SB328	SB328-20191115-0006	11/15/2019	N	0 - 0.5	Surface Soil
SA-SB328	SB328-20191115-0624	11/15/2019	N	0.5 - 2	Near Surface Soil
SA-SB328	SB328-20191115-2448	11/15/2019	N	2 - 4	Subsurface Soil
SA-SB328	SB328-20191115-4872	11/15/2019	N	4 - 6	Subsurface Soil
SA-SB366	SB366-20191115-0006	11/15/2019	N	0 - 0.5	Surface Soil
SA-SB366	SB366-20191115-0624	11/15/2019	N	0.5 - 2	Near Surface Soil
SA-SB366	SB366-20191115-2448	11/15/2019	N	2 - 4	Subsurface Soil
SA-SB366	SB366-20191115-4872	11/15/2019	N	4 - 6	Subsurface Soil
SA-SB369	SB369-20191121-0006	11/21/2019	N	0 - 0.5	Surface Soil
SA-SB369	SB369-20191121-0624	11/21/2019	N	0.5 - 2	Near Surface Soil
SA-SB369	SB369-20191121-6084	11/21/2019	N	5 - 7	Subsurface Soil

Notes:
ft bgs = feet below ground surface

(1) Within a single sample location and depth interval, the highest detected result was selected between the primary (N) and field duplicate (FD) samples where applicable.

APPENDIX C

Table C-1
Dioxin Toxicity Equivalency Factors (TEFs)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Analyte	TEF (unitless)*
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	0.0003
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	0.0003
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.01
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.01
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01
1,2,3,4,7,8-Hexachlorodibenzofuran	0.1
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.1
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.1
1,2,3,7,8,9-Hexachlorodibenzofuran	0.1
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.1
1,2,3,7,8-Pentachlorodibenzofuran	0.03
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1
2,3,4,6,7,8-Hexachlorodibenzofuran	0.1
2,3,4,7,8-Pentachlorodibenzofuran	0.3
2,3,7,8-Tetrachlorodibenzofuran	0.1
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1
PCB-105	0.00003
PCB-114	0.00003
PCB-118	0.00003
PCB-123	0.00003
PCB-126	0.1
PCB-156	0.00003
PCB-157	0.00003
PCB-167	0.00003
PCB-169	0.03
PCB-189	0.00003
PCB-77	0.0001
PCB-81	0.0003

*Van den Berg et al., 2006

APPENDIX D

Appendix D

Support Documentation for the Calculation of Exposure Point Concentrations (EPCs)

Human Health Risk Assessment

Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.14/8/2022 5:28:37 PM		
From File	WorkSheet.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Conc (so | site-wide | near surface soil | include | aluminum | 434)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	56
		Number of Missing Observations	0
Minimum	2260	Mean	7992
Maximum	19000	Median	7650
SD	3280	Std. Error of Mean	423.5
Coefficient of Variation	0.41	Skewness	0.661
Normal GOF Test			
Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.186	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0671	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.114	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	8700	95% Adjusted-CLT UCL (Chen-1995)	8727
		95% Modified-t UCL (Johnson-1978)	8706
Gamma GOF Test			
A-D Test Statistic	0.408	**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	0.0844	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.115	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.679	k star (bias corrected MLE)	5.406
Theta hat (MLE)	1407	Theta star (bias corrected MLE)	1478
nu hat (MLE)	681.5	nu star (bias corrected)	648.7
MLE Mean (bias corrected)	7992	MLE Sd (bias corrected)	3437
		Approximate Chi Square Value (0.05)	590.6
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	589.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8778	95% Adjusted Gamma UCL (use when n<50)	8798
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.1	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.103	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.114	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			

Minimum of Logged Data	7.723	Mean of logged Data	8.896
Maximum of Logged Data	9.852	SD of logged Data	0.449
Assuming Lognormal Distribution			
95% H-UCL	9003	90% Chebyshev (MVUE) UCL	9519
95% Chebyshev (MVUE) UCL	10181	97.5% Chebyshev (MVUE) UCL	11099
99% Chebyshev (MVUE) UCL	12902		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8689	95% Jackknife UCL	8700
95% Standard Bootstrap UCL	8704	95% Bootstrap-t UCL	8743
95% Hall's Bootstrap UCL	8776	95% Percentile Bootstrap UCL	8717
95% BCA Bootstrap UCL	8764		
90% Chebyshev(Mean, Sd) UCL	9263	95% Chebyshev(Mean, Sd) UCL	9838
97.5% Chebyshev(Mean, Sd) UCL	10637	99% Chebyshev(Mean, Sd) UCL	12206
Suggested UCL to Use			
95% Student's-t UCL	8700		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | antimony | 435)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	35
Number of Detects	33	Number of Non-Detects	27
Number of Distinct Detects	24	Number of Distinct Non-Detects	13
Minimum Detect	0.21	Minimum Non-Detect	0.82
Maximum Detect	4.4	Maximum Non-Detect	8.2
Variance Detects	0.877	Percent Non-Detects	45%
Mean Detects	0.976	SD Detects	0.937
Median Detects	0.72	CV Detects	0.96
Skewness Detects	2.226	Kurtosis Detects	5.719
Mean of Logged Detects	-0.374	SD of Logged Detects	0.834
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.747	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.224	**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			
KM Mean	0.828	KM Standard Error of Mean	0.121
KM SD	0.805	95% KM (BCA) UCL	1.066
95% KM (t) UCL	1.03	95% KM (Percentile Bootstrap) UCL	1.045
95% KM (z) UCL	1.027	95% KM Bootstrap t UCL	1.1
90% KM Chebyshev UCL	1.191	95% KM Chebyshev UCL	1.355
97.5% KM Chebyshev UCL	1.582	99% KM Chebyshev UCL	2.03
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.882	**Anderson-Darling GOF Test**	

5% A-D Critical Value	0.764	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.149	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.156	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)	1.575	k star (bias corrected MLE)	1.452
Theta hat (MLE)	0.619	Theta star (bias corrected MLE)	0.672
nu hat (MLE)	104	nu star (bias corrected)	95.84
Mean (detects)	0.976		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.779
Maximum	4.4	Median	0.617
SD	0.751	CV	0.965
k hat (MLE)	1.538	k star (bias corrected MLE)	1.472
Theta hat (MLE)	0.507	Theta star (bias corrected MLE)	0.529
nu hat (MLE)	184.5	nu star (bias corrected)	176.6
Adjusted Level of Significance (β)	0.046		
Approximate Chi Square Value (176.61, α)	146.9	Adjusted Chi Square Value (176.61, β)	146.2
95% Gamma Approximate UCL (use when n>=50)	0.936	95% Gamma Adjusted UCL (use when n<50)	0.941
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.828	SD (KM)	0.805
Variance (KM)	0.648	SE of Mean (KM)	0.121
k hat (KM)	1.059	k star (KM)	1.017
nu hat (KM)	127.1	nu star (KM)	122
theta hat (KM)	0.782	theta star (KM)	0.814
80% gamma percentile (KM)	1.331	90% gamma percentile (KM)	1.899
95% gamma percentile (KM)	2.466	99% gamma percentile (KM)	3.782
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (122.03, α)	97.52	Adjusted Chi Square Value (122.03, β)	96.98
95% Gamma Approximate KM-UCL (use when n>=50)	1.036	95% Gamma Adjusted KM-UCL (use when n<50)	1.042
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**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	0.784	Mean in Log Scale	-0.507
SD in Original Scale	0.734	SD in Log Scale	0.683
95% t UCL (assumes normality of ROS data)	0.942	95% Percentile Bootstrap UCL	0.954
95% BCA Bootstrap UCL	1.001	95% Bootstrap t UCL	1.011
95% H-UCL (Log ROS)	0.911		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.515	KM Geo Mean	0.597
KM SD (logged)	0.772	95% Critical H Value (KM-Log)	2.108
KM Standard Error of Mean (logged)	0.126	95% H-UCL (KM -Log)	0.995

KM SD (logged)	0.772	95% Critical H Value (KM-Log)	2.108
KM Standard Error of Mean (logged)	0.126		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.307	Mean in Log Scale	-0.133
SD in Original Scale	1.22	SD in Log Scale	0.894
95% t UCL (Assumes normality)	1.57	95% H-Stat UCL	1.692
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 Approximate Gamma UCL	1.036	95% GROS Approximate Gamma UCL	0.936
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | arsenic | 436)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	51
		Number of Missing Observations	0
Minimum	1.9	Mean	11.23
Maximum	82.8	Median	8.3
SD	11.44	Std. Error of Mean	1.477
Coefficient of Variation	1.018	Skewness	4.65
Normal GOF Test			
Shapiro Wilk Test Statistic	0.566	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.231	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.114	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	13.7	95% Adjusted-CLT UCL (Chen-1995)	14.61
		95% Modified-t UCL (Johnson-1978)	13.85
Gamma GOF Test			
A-D Test Statistic	1.527	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.762	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.116	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.116	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.158	k star (bias corrected MLE)	2.061
Theta hat (MLE)	5.204	Theta star (bias corrected MLE)	5.448
nu hat (MLE)	259	nu star (bias corrected)	247.3

MLE Mean (bias corrected)	11.23	MLE Sd (bias corrected)	7.822
		Approximate Chi Square Value (0.05)	211.9
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	211.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	13.11	95% Adjusted Gamma UCL (use when n<50)	13.16
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.18	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.092	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.114	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.642	Mean of logged Data	2.169
Maximum of Logged Data	4.416	SD of logged Data	0.664
Assuming Lognormal Distribution			
95% H-UCL	12.98	90% Chebyshev (MVUE) UCL	13.9
95% Chebyshev (MVUE) UCL	15.28	97.5% Chebyshev (MVUE) UCL	17.19
99% Chebyshev (MVUE) UCL	20.95		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	13.66	95% Jackknife UCL	13.7
95% Standard Bootstrap UCL	13.59	95% Bootstrap-t UCL	15.69
95% Hall's Bootstrap UCL	25.19	95% Percentile Bootstrap UCL	13.75
95% BCA Bootstrap UCL	15		
90% Chebyshev(Mean, Sd) UCL	15.66	95% Chebyshev(Mean, Sd) UCL	17.67
97.5% Chebyshev(Mean, Sd) UCL	20.45	99% Chebyshev(Mean, Sd) UCL	25.92
Suggested UCL to Use			
95% H-UCL	12.98		
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.			
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.			
Conc (so | site-wide | near surface soil | include | benzo(a)anthracene | 87)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	48
Number of Detects	58	Number of Non-Detects	2
Number of Distinct Detects	46	Number of Distinct Non-Detects	2
Minimum Detect	0.0016	Minimum Non-Detect	0.0037
Maximum Detect	3.9	Maximum Non-Detect	0.0039
Variance Detects	0.282	Percent Non-Detects	3.333%
Mean Detects	0.171	SD Detects	0.531
Median Detects	0.0635	CV Detects	3.102

Skewness Detects	6.438	Kurtosis Detects	44.46
Mean of Logged Detects	-3.083	SD of Logged Detects	1.586
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.305	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.375	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	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			
KM Mean	0.166	KM Standard Error of Mean	0.0676
KM SD	0.519	95% KM (BCA) UCL	0.29
95% KM (t) UCL	0.279	95% KM (Percentile Bootstrap) UCL	0.294
95% KM (z) UCL	0.277	95% KM Bootstrap t UCL	0.688
90% KM Chebyshev UCL	0.368	95% KM Chebyshev UCL	0.46
97.5% KM Chebyshev UCL	0.588	99% KM Chebyshev UCL	0.838
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.424	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.819	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.165	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.124	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)	0.484	k star (bias corrected MLE)	0.471
Theta hat (MLE)	0.354	Theta star (bias corrected MLE)	0.364
nu hat (MLE)	56.17	nu star (bias corrected)	54.6
Mean (detects)	0.171		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0016	Mean	0.166
Maximum	3.9	Median	0.054
SD	0.523	CV	3.153
k hat (MLE)	0.478	k star (bias corrected MLE)	0.466
Theta hat (MLE)	0.347	Theta star (bias corrected MLE)	0.356
nu hat (MLE)	57.4	nu star (bias corrected)	55.86
Adjusted Level of Significance (β)	0.046		
Approximate Chi Square Value (55.86, α)	39.68	Adjusted Chi Square Value (55.86, β)	39.35
95% Gamma Approximate UCL (use when n>=50)	0.234	95% Gamma Adjusted UCL (use when n<50)	0.236
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.166	SD (KM)	0.519
Variance (KM)	0.269	SE of Mean (KM)	0.0676
k hat (KM)	0.102	k star (KM)	0.108
nu hat (KM)	12.23	nu star (KM)	12.95
theta hat (KM)	1.625	theta star (KM)	1.535
80% gamma percentile (KM)	0.128	90% gamma percentile (KM)	0.454
95% gamma percentile (KM)	0.956	99% gamma percentile (KM)	2.532
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (12.95, α)	5.862	Adjusted Chi Square Value (12.95, β)	5.744

95% Gamma Approximate KM-UCL (use when n>=50)	0.366	95% Gamma Adjusted KM-UCL (use when n<50)	0.374
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.979	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.663	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0946	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	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	0.166	Mean in Log Scale	-3.179
SD in Original Scale	0.523	SD in Log Scale	1.645
95% t UCL (assumes normality of ROS data)	0.279	95% Percentile Bootstrap UCL	0.29
95% BCA Bootstrap UCL	0.378	95% Bootstrap t UCL	0.68
95% H-UCL (Log ROS)	0.333		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.186	KM Geo Mean	0.0413
KM SD (logged)	1.643	95% Critical H Value (KM-Log)	3.386
KM Standard Error of Mean (logged)	0.214	95% H-UCL (KM -Log)	0.329
KM SD (logged)	1.643	95% Critical H Value (KM-Log)	3.386
KM Standard Error of Mean (logged)	0.214		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.166	Mean in Log Scale	-3.189
SD in Original Scale	0.523	SD in Log Scale	1.662
95% t UCL (Assumes normality)	0.279	95% H-Stat UCL	0.343
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			
KM H-UCL	0.329		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | benzo(a)pyrene | 88)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	48
Number of Detects	58	Number of Non-Detects	2
Number of Distinct Detects	46	Number of Distinct Non-Detects	2
Minimum Detect	0.0012	Minimum Non-Detect	0.0037
Maximum Detect	3.3	Maximum Non-Detect	0.0039
Variance Detects	0.197	Percent Non-Detects	3.333%
Mean Detects	0.145	SD Detects	0.444
Median Detects	0.0545	CV Detects	3.058
Skewness Detects	6.606	Kurtosis Detects	46.75
Mean of Logged Detects	-3.242	SD of Logged Detects	1.607
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.308	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	

Lilliefors Test Statistic	0.373	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	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			
KM Mean	0.14	KM Standard Error of Mean	0.0564
KM SD	0.433	95% KM (BCA) UCL	0.253
95% KM (t) UCL	0.235	95% KM (Percentile Bootstrap) UCL	0.244
95% KM (z) UCL	0.233	95% KM Bootstrap t UCL	0.507
90% KM Chebyshev UCL	0.31	95% KM Chebyshev UCL	0.386
97.5% KM Chebyshev UCL	0.493	99% KM Chebyshev UCL	0.702
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.163	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.819	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.183	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.124	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)	0.473
Theta hat (MLE)	0.298	Theta star (bias corrected MLE)	0.307
nu hat (MLE)	56.41	nu star (bias corrected)	54.83
Mean (detects)	0.145		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0012	Mean	0.141
Maximum	3.3	Median	0.05
SD	0.437	CV	3.107
k hat (MLE)	0.482	k star (bias corrected MLE)	0.469
Theta hat (MLE)	0.292	Theta star (bias corrected MLE)	0.3
nu hat (MLE)	57.83	nu star (bias corrected)	56.27
Adjusted Level of Significance (β)	0.046		
Approximate Chi Square Value (56.27, α)	40.03	Adjusted Chi Square Value (56.27, β)	39.69
95% Gamma Approximate UCL (use when n>=50)	0.198	95% Gamma Adjusted UCL (use when n<50)	0.199
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.14	SD (KM)	0.433
Variance (KM)	0.188	SE of Mean (KM)	0.0564
k hat (KM)	0.105	k star (KM)	0.111
nu hat (KM)	12.59	nu star (KM)	13.29
theta hat (KM)	1.338	theta star (KM)	1.267
80% gamma percentile (KM)	0.112	90% gamma percentile (KM)	0.388
95% gamma percentile (KM)	0.808	99% gamma percentile (KM)	2.117
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.29, α)	6.088	Adjusted Chi Square Value (13.29, β)	5.968
95% Gamma Approximate KM-UCL (use when n>=50)	0.306	95% Gamma Adjusted KM-UCL (use when n<50)	0.313
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.981	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.738	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0968	**Lilliefors GOF Test**	

5% Lilliefors Critical Value	0.116	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	0.14	Mean in Log Scale	-3.34
SD in Original Scale	0.437	SD in Log Scale	1.667
95% t UCL (assumes normality of ROS data)	0.235	95% Percentile Bootstrap UCL	0.246
95% BCA Bootstrap UCL	0.317	95% Bootstrap t UCL	0.523
95% H-UCL (Log ROS)	0.299		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.346	KM Geo Mean	0.0352
KM SD (logged)	1.664	95% Critical H Value (KM-Log)	3.415
KM Standard Error of Mean (logged)	0.217	95% H-UCL (KM -Log)	0.295
KM SD (logged)	1.664	95% Critical H Value (KM-Log)	3.415
KM Standard Error of Mean (logged)	0.217		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.14	Mean in Log Scale	-3.343
SD in Original Scale	0.437	SD in Log Scale	1.671
95% t UCL (Assumes normality)	0.235	95% H-Stat UCL	0.301
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			
KM H-UCL	0.295		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | benzo(b)fluoranthene | 89)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	51
Number of Detects	58	Number of Non-Detects	2
Number of Distinct Detects	49	Number of Distinct Non-Detects	2
Minimum Detect	0.0019	Minimum Non-Detect	0.0037
Maximum Detect	5.7	Maximum Non-Detect	0.0039
Variance Detects	0.613	Percent Non-Detects	3.333%
Mean Detects	0.26	SD Detects	0.783
Median Detects	0.086	CV Detects	3.011
Skewness Detects	6.289	Kurtosis Detects	42.75
Mean of Logged Detects	-2.638	SD of Logged Detects	1.586
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.317	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.371	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	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			
KM Mean	0.251	KM Standard Error of Mean	0.0996

KM SD	0.765	95% KM (BCA) UCL	0.439
95% KM (t) UCL	0.418	95% KM (Percentile Bootstrap) UCL	0.435
95% KM (z) UCL	0.415	95% KM Bootstrap t UCL	0.962
90% KM Chebyshev UCL	0.55	95% KM Chebyshev UCL	0.685
97.5% KM Chebyshev UCL	0.873	99% KM Chebyshev UCL	1.242
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.517	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.817	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.169	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.124	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)	0.493	k star (bias corrected MLE)	0.479
Theta hat (MLE)	0.527	Theta star (bias corrected MLE)	0.543
nu hat (MLE)	57.2	nu star (bias corrected)	55.57
Mean (detects)	0.26		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0019	Mean	0.252
Maximum	5.7	Median	0.082
SD	0.771	CV	3.063
k hat (MLE)	0.482	k star (bias corrected MLE)	0.469
Theta hat (MLE)	0.522	Theta star (bias corrected MLE)	0.536
nu hat (MLE)	57.89	nu star (bias corrected)	56.33
Adjusted Level of Significance (β)	0.046		
Approximate Chi Square Value (56.33, α)	40.08	Adjusted Chi Square Value (56.33, β)	39.74
95% Gamma Approximate UCL (use when n>=50)	0.354	95% Gamma Adjusted UCL (use when n<50)	0.357
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.251	SD (KM)	0.765
Variance (KM)	0.584	SE of Mean (KM)	0.0996
k hat (KM)	0.108	k star (KM)	0.114
nu hat (KM)	12.98	nu star (KM)	13.66
theta hat (KM)	2.325	theta star (KM)	2.208
80% gamma percentile (KM)	0.207	90% gamma percentile (KM)	0.701
95% gamma percentile (KM)	1.444	99% gamma percentile (KM)	3.739
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.66, α)	6.34	Adjusted Chi Square Value (13.66, β)	6.217
95% Gamma Approximate KM-UCL (use when n>=50)	0.542	95% Gamma Adjusted KM-UCL (use when n<50)	0.552
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.977	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.558	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0799	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	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	0.251	Mean in Log Scale	-2.735
SD in Original Scale	0.771	SD in Log Scale	1.645

95% t UCL (assumes normality of ROS data)	0.418	95% Percentile Bootstrap UCL	0.444
95% BCA Bootstrap UCL	0.573	95% Bootstrap t UCL	0.988
95% H-UCL (Log ROS)	0.519		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.751	KM Geo Mean	0.0639
KM SD (logged)	1.661	95% Critical H Value (KM-Log)	3.411
KM Standard Error of Mean (logged)	0.216	95% H-UCL (KM -Log)	0.531
KM SD (logged)	1.661	95% Critical H Value (KM-Log)	3.411
KM Standard Error of Mean (logged)	0.216		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.251	Mean in Log Scale	-2.759
SD in Original Scale	0.771	SD in Log Scale	1.692
95% t UCL (Assumes normality)	0.418	95% H-Stat UCL	0.567
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			
KM H-UCL	0.531		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | cadmium | 439)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	36
Number of Detects	54	Number of Non-Detects	6
Number of Distinct Detects	31	Number of Distinct Non-Detects	5
Minimum Detect	0.077	Minimum Non-Detect	0.55
Maximum Detect	2.2	Maximum Non-Detect	0.63
Variance Detects	0.122	Percent Non-Detects	10%
Mean Detects	0.34	SD Detects	0.349
Median Detects	0.265	CV Detects	1.026
Skewness Detects	3.872	Kurtosis Detects	17.02
Mean of Logged Detects	-1.326	SD of Logged Detects	0.633
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.555	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.12	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			
KM Mean	0.332	KM Standard Error of Mean	0.0433
KM SD	0.33	95% KM (BCA) UCL	0.412
95% KM (t) UCL	0.405	95% KM (Percentile Bootstrap) UCL	0.41
95% KM (z) UCL	0.404	95% KM Bootstrap t UCL	0.463
90% KM Chebyshev UCL	0.462	95% KM Chebyshev UCL	0.521
97.5% KM Chebyshev UCL	0.603	99% KM Chebyshev UCL	0.763

Appendix D
Support Documentation for the Calculation of Exposure Point Concentrations (EPCs)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.44	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.762	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.186	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.122	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)	2.172	k star (bias corrected MLE)	2.064
Theta hat (MLE)	0.156	Theta star (bias corrected MLE)	0.165
nu hat (MLE)	234.6	nu star (bias corrected)	222.9
Mean (detects)	0.34		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.077	Mean	0.332
Maximum	2.2	Median	0.26
SD	0.332	CV	1
k hat (MLE)	2.337	k star (bias corrected MLE)	2.231
Theta hat (MLE)	0.142	Theta star (bias corrected MLE)	0.149
nu hat (MLE)	280.4	nu star (bias corrected)	267.7
Adjusted Level of Significance (β)	0.046		
Approximate Chi Square Value (267.74, α)	230.8	Adjusted Chi Square Value (267.74, β)	230
95% Gamma Approximate UCL (use when n>=50)	0.385	95% Gamma Adjusted UCL (use when n<50)	0.386
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.332	SD (KM)	0.33
Variance (KM)	0.109	SE of Mean (KM)	0.0433
k hat (KM)	1.012	k star (KM)	0.973
nu hat (KM)	121.4	nu star (KM)	116.7
theta hat (KM)	0.328	theta star (KM)	0.342
80% gamma percentile (KM)	0.536	90% gamma percentile (KM)	0.77
95% gamma percentile (KM)	1.005	99% gamma percentile (KM)	1.552
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (116.71, α)	92.76	Adjusted Chi Square Value (116.71, β)	92.24
95% Gamma Approximate KM-UCL (use when n>=50)	0.418	95% Gamma Adjusted KM-UCL (use when n<50)	0.42
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.933	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.00612	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.125	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.12	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	0.331	Mean in Log Scale	-1.332
SD in Original Scale	0.332	SD in Log Scale	0.602
95% t UCL (assumes normality of ROS data)	0.403	95% Percentile Bootstrap UCL	0.407
95% BCA Bootstrap UCL	0.432	95% Bootstrap t UCL	0.463
95% H-UCL (Log ROS)	0.369		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.337	KM Geo Mean	0.263

KM SD (logged)	0.614	95% Critical H Value (KM-Log)	1.972
KM Standard Error of Mean (logged)	0.0825	95% H-UCL (KM -Log)	0.371
KM SD (logged)	0.614	95% Critical H Value (KM-Log)	1.972
KM Standard Error of Mean (logged)	0.0825		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.335	Mean in Log Scale	-1.318
SD in Original Scale	0.331	SD in Log Scale	0.601
95% t UCL (Assumes normality)	0.406	95% H-Stat UCL	0.374
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.521		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | chromium | 441)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	52
		Number of Missing Observations	0
Minimum	5.2	Mean	14.37
Maximum	43.9	Median	13
SD	6.925	Std. Error of Mean	0.894
Coefficient of Variation	0.482	Skewness	2.305
Normal GOF Test			
Shapiro Wilk Test Statistic	0.806	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	2.099E-10	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.121	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.114	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	15.86	95% Adjusted-CLT UCL (Chen-1995)	16.12
		95% Modified-t UCL (Johnson-1978)	15.91
Gamma GOF Test			
A-D Test Statistic	0.635	**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	0.075	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.115	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.811	k star (bias corrected MLE)	5.531
Theta hat (MLE)	2.473	Theta star (bias corrected MLE)	2.598
nu hat (MLE)	697.3	nu star (bias corrected)	663.7
MLE Mean (bias corrected)	14.37	MLE Sd (bias corrected)	6.109

		Approximate Chi Square Value (0.05)	605
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	603.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	15.76	95% Adjusted Gamma UCL (use when n<50)	15.8
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.496	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0652	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.114	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.649	Mean of logged Data	2.577
Maximum of Logged Data	3.782	SD of logged Data	0.41
Assuming Lognormal Distribution			
95% H-UCL	15.78	90% Chebyshev (MVUE) UCL	16.63
95% Chebyshev (MVUE) UCL	17.7	97.5% Chebyshev (MVUE) UCL	19.18
99% Chebyshev (MVUE) UCL	22.08		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	15.84	95% Jackknife UCL	15.86
95% Standard Bootstrap UCL	15.84	95% Bootstrap-t UCL	16.33
95% Hall's Bootstrap UCL	16.7	95% Percentile Bootstrap UCL	15.88
95% BCA Bootstrap UCL	16.13		
90% Chebyshev(Mean, Sd) UCL	17.05	95% Chebyshev(Mean, Sd) UCL	18.27
97.5% Chebyshev(Mean, Sd) UCL	19.95	99% Chebyshev(Mean, Sd) UCL	23.26
Suggested UCL to Use			
95% Approximate Gamma UCL	15.76		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | cobalt | 442)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	2.9	Mean	10.02
Maximum	28.1	Median	9.1
SD	5.126	Std. Error of Mean	0.662
Coefficient of Variation	0.512	Skewness	1.44
Normal GOF Test			
Shapiro Wilk Test Statistic	0.885	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	5.5558E-6	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.114	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	11.13	95% Adjusted-CLT UCL (Chen-1995)	11.24
		95% Modified-t UCL (Johnson-1978)	11.15
Gamma GOF Test			
A-D Test Statistic	0.455	**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	0.0794	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.115	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.43	k star (bias corrected MLE)	4.22
Theta hat (MLE)	2.262	Theta star (bias corrected MLE)	2.375
nu hat (MLE)	531.6	nu star (bias corrected)	506.4
MLE Mean (bias corrected)	10.02	MLE Sd (bias corrected)	4.879
		Approximate Chi Square Value (0.05)	455.2
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	454
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	11.15	95% Adjusted Gamma UCL (use when n<50)	11.18
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.513	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0728	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.114	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.065	Mean of logged Data	2.188
Maximum of Logged Data	3.336	SD of logged Data	0.49
Assuming Lognormal Distribution			
95% H-UCL	11.34	90% Chebyshev (MVUE) UCL	12.03
95% Chebyshev (MVUE) UCL	12.93	97.5% Chebyshev (MVUE) UCL	14.19
99% Chebyshev (MVUE) UCL	16.66		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	11.11	95% Jackknife UCL	11.13
95% Standard Bootstrap UCL	11.11	95% Bootstrap-t UCL	11.23
95% Hall's Bootstrap UCL	11.29	95% Percentile Bootstrap UCL	11.11
95% BCA Bootstrap UCL	11.22		
90% Chebyshev(Mean, Sd) UCL	12.01	95% Chebyshev(Mean, Sd) UCL	12.91
97.5% Chebyshev(Mean, Sd) UCL	14.15	99% Chebyshev(Mean, Sd) UCL	16.61
Suggested UCL to Use			
95% Approximate Gamma UCL	11.15		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Conc (so | site-wide | near surface soil | include | indeno(1,2,3-cd)pyrene | 111)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	50
Number of Detects	58	Number of Non-Detects	2
Number of Distinct Detects	49	Number of Distinct Non-Detects	2
Minimum Detect	8.1000E-4	Minimum Non-Detect	0.0037
Maximum Detect	1.5	Maximum Non-Detect	0.0039
Variance Detects	0.0453	Percent Non-Detects	3.333%
Mean Detects	0.0804	SD Detects	0.213
Median Detects	0.033	CV Detects	2.646
Skewness Detects	5.721	Kurtosis Detects	36.39
Mean of Logged Detects	-3.811	SD of Logged Detects	1.617
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.373	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.354	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	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			
KM Mean	0.0778	KM Standard Error of Mean	0.0271
KM SD	0.208	95% KM (BCA) UCL	0.129
95% KM (t) UCL	0.123	95% KM (Percentile Bootstrap) UCL	0.13
95% KM (z) UCL	0.122	95% KM Bootstrap t UCL	0.22
90% KM Chebyshev UCL	0.159	95% KM Chebyshev UCL	0.196
97.5% KM Chebyshev UCL	0.247	99% KM Chebyshev UCL	0.347
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.988	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.817	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.162	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.124	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)	0.493	k star (bias corrected MLE)	0.479
Theta hat (MLE)	0.163	Theta star (bias corrected MLE)	0.168
nu hat (MLE)	57.24	nu star (bias corrected)	55.61
Mean (detects)	0.0804		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	8.1000E-4	Mean	0.078
Maximum	1.5	Median	0.0305
SD	0.209	CV	2.684
k hat (MLE)	0.494	k star (bias corrected MLE)	0.481
Theta hat (MLE)	0.158	Theta star (bias corrected MLE)	0.162
nu hat (MLE)	59.34	nu star (bias corrected)	57.7
Adjusted Level of Significance (β)	0.046		
Approximate Chi Square Value (57.70, α)	41.24	Adjusted Chi Square Value (57.70, β)	40.9
95% Gamma Approximate UCL (use when n>=50)	0.109	95% Gamma Adjusted UCL (use when n<50)	0.11

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0778	SD (KM)	0.208
Variance (KM)	0.0432	SE of Mean (KM)	0.0271
k hat (KM)	0.14	k star (KM)	0.144
nu hat (KM)	16.8	nu star (KM)	17.3
theta hat (KM)	0.555	theta star (KM)	0.54
80% gamma percentile (KM)	0.0819	90% gamma percentile (KM)	0.229
95% gamma percentile (KM)	0.431	99% gamma percentile (KM)	1.023
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (17.30, α)	8.886	Adjusted Chi Square Value (17.30, β)	8.737
95% Gamma Approximate KM-UCL (use when n>=50)	0.151	95% Gamma Adjusted KM-UCL (use when n<50)	0.154
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.979	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.645	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	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	0.0778	Mean in Log Scale	-3.891
SD in Original Scale	0.21	SD in Log Scale	1.649
95% t UCL (assumes normality of ROS data)	0.123	95% Percentile Bootstrap UCL	0.124
95% BCA Bootstrap UCL	0.15	95% Bootstrap t UCL	0.223
95% H-UCL (Log ROS)	0.165		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.894	KM Geo Mean	0.0204
KM SD (logged)	1.641	95% Critical H Value (KM-Log)	3.384
KM Standard Error of Mean (logged)	0.214	95% H-UCL (KM -Log)	0.161
KM SD (logged)	1.641	95% Critical H Value (KM-Log)	3.384
KM Standard Error of Mean (logged)	0.214		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0778	Mean in Log Scale	-3.893
SD in Original Scale	0.21	SD in Log Scale	1.651
95% t UCL (Assumes normality)	0.123	95% H-Stat UCL	0.165
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			
KM H-UCL	0.161		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | iron | 444)			
General Statistics			
Total Number of Observations	59	Number of Distinct Observations	52

		Number of Missing Observations	0
Minimum	5700	Mean	21653
Maximum	77700	Median	17900
SD	12836	Std. Error of Mean	1671
Coefficient of Variation	0.593	Skewness	2.237
Normal GOF Test			
Shapiro Wilk Test Statistic	0.794	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	8.044E-11	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.115	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	24446	95% Adjusted-CLT UCL (Chen-1995)	24921
		95% Modified-t UCL (Johnson-1978)	24527
Gamma GOF Test			
A-D Test Statistic	1.35	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.149	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.116	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.035	k star (bias corrected MLE)	3.841
Theta hat (MLE)	5366	Theta star (bias corrected MLE)	5637
nu hat (MLE)	476.2	nu star (bias corrected)	453.3
MLE Mean (bias corrected)	21653	MLE Sd (bias corrected)	11047
		Approximate Chi Square Value (0.05)	404.9
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	403.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	24239	95% Adjusted Gamma UCL (use when n<50)	24307
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.489	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.113	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.115	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	8.648	Mean of logged Data	9.854
Maximum of Logged Data	11.26	SD of logged Data	0.492
Assuming Lognormal Distribution			
95% H-UCL	24261	90% Chebyshev (MVUE) UCL	25755
95% Chebyshev (MVUE) UCL	27713	97.5% Chebyshev (MVUE) UCL	30432
99% Chebyshev (MVUE) UCL	35772		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	24401	95% Jackknife UCL	24446
95% Standard Bootstrap UCL	24365	95% Bootstrap-t UCL	25317

95% Hall's Bootstrap UCL	25393	95% Percentile Bootstrap UCL	24656
95% BCA Bootstrap UCL	24951		
90% Chebyshev(Mean, Sd) UCL	26666	95% Chebyshev(Mean, Sd) UCL	28937
97.5% Chebyshev(Mean, Sd) UCL	32089	99% Chebyshev(Mean, Sd) UCL	38280
Suggested UCL to Use			
95% Student's-t UCL	24446	or 95% Modified-t UCL	24527
or 95% H-UCL	24261		
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.			
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.			
Conc (so | site-wide | near surface soil | include | manganese | 447)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	54
		Number of Missing Observations	0
Minimum	50	Mean	424.7
Maximum	2630	Median	365.5
SD	362.7	Std. Error of Mean	46.83
Coefficient of Variation	0.854	Skewness	4.071
Normal GOF Test			
Shapiro Wilk Test Statistic	0.668	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.114	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	503	95% Adjusted-CLT UCL (Chen-1995)	528
		95% Modified-t UCL (Johnson-1978)	507.1
Gamma GOF Test			
A-D Test Statistic	0.69	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.761	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.106	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.116	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.365	k star (bias corrected MLE)	2.257
Theta hat (MLE)	179.6	Theta star (bias corrected MLE)	188.1
nu hat (MLE)	283.7	nu star (bias corrected)	270.9
MLE Mean (bias corrected)	424.7	MLE Sd (bias corrected)	282.7
		Approximate Chi Square Value (0.05)	233.8
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	232.9
Assuming Gamma Distribution			

95% Approximate Gamma UCL (use when n>=50)	492.2	95% Adjusted Gamma UCL (use when n<50)	493.9
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.805	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0783	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.114	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.912	Mean of logged Data	5.825
Maximum of Logged Data	7.875	SD of logged Data	0.673
Assuming Lognormal Distribution			
95% H-UCL	507	90% Chebyshev (MVUE) UCL	543.1
95% Chebyshev (MVUE) UCL	597.5	97.5% Chebyshev (MVUE) UCL	673.1
99% Chebyshev (MVUE) UCL	821.5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	501.7	95% Jackknife UCL	503
95% Standard Bootstrap UCL	499.1	95% Bootstrap-t UCL	547.5
95% Hall's Bootstrap UCL	868.6	95% Percentile Bootstrap UCL	510.3
95% BCA Bootstrap UCL	528.3		
90% Chebyshev(Mean, Sd) UCL	565.2	95% Chebyshev(Mean, Sd) UCL	628.8
97.5% Chebyshev(Mean, Sd) UCL	717.2	99% Chebyshev(Mean, Sd) UCL	890.6
Suggested UCL to Use			
95% Approximate Gamma UCL	492.2		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | thallium | 454)			
General Statistics			
Total Number of Observations	60	Number of Distinct Observations	37
Number of Detects	20	Number of Non-Detects	40
Number of Distinct Detects	19	Number of Distinct Non-Detects	18
Minimum Detect	0.038	Minimum Non-Detect	0.51
Maximum Detect	0.34	Maximum Non-Detect	3.4
Variance Detects	0.0066	Percent Non-Detects	66.67%
Mean Detects	0.134	SD Detects	0.0812
Median Detects	0.125	CV Detects	0.606
Skewness Detects	1.011	Kurtosis Detects	0.666
Mean of Logged Detects	-2.184	SD of Logged Detects	0.618
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.192	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			
KM Mean	0.134	KM Standard Error of Mean	0.0182
KM SD	0.0792	95% KM (BCA) UCL	0.164
95% KM (t) UCL	0.164	95% KM (Percentile Bootstrap) UCL	0.166
95% KM (z) UCL	0.164	95% KM Bootstrap t UCL	0.174
90% KM Chebyshev UCL	0.189	95% KM Chebyshev UCL	0.213
97.5% KM Chebyshev UCL	0.248	99% KM Chebyshev UCL	0.315
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.228	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.115	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.013	k star (bias corrected MLE)	2.595
Theta hat (MLE)	0.0445	Theta star (bias corrected MLE)	0.0517
nu hat (MLE)	120.5	nu star (bias corrected)	103.8
Mean (detects)	0.134		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.038	Mean	0.128
Maximum	0.34	Median	0.121
SD	0.0598	CV	0.465
k hat (MLE)	4.872	k star (bias corrected MLE)	4.64
Theta hat (MLE)	0.0264	Theta star (bias corrected MLE)	0.0277
nu hat (MLE)	584.6	nu star (bias corrected)	556.7
Adjusted Level of Significance (β)	0.046		
Approximate Chi Square Value (556.74, α)	503	Adjusted Chi Square Value (556.74, β)	501.8
95% Gamma Approximate UCL (use when n>=50)	0.142	95% Gamma Adjusted UCL (use when n<50)	0.142
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.134	SD (KM)	0.0792
Variance (KM)	0.00627	SE of Mean (KM)	0.0182
k hat (KM)	2.87	k star (KM)	2.737
nu hat (KM)	344.4	nu star (KM)	328.5
theta hat (KM)	0.0467	theta star (KM)	0.049
80% gamma percentile (KM)	0.193	90% gamma percentile (KM)	0.243
95% gamma percentile (KM)	0.289	99% gamma percentile (KM)	0.39
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (328.47, α)	287.5	Adjusted Chi Square Value (328.47, β)	286.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.153	95% Gamma Adjusted KM-UCL (use when n<50)	0.154
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.106	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.192	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	0.125	Mean in Log Scale	-2.184
SD in Original Scale	0.0587	SD in Log Scale	0.458
95% t UCL (assumes normality of ROS data)	0.137	95% Percentile Bootstrap UCL	0.137
95% BCA Bootstrap UCL	0.139	95% Bootstrap t UCL	0.139
95% H-UCL (Log ROS)	0.14		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.184	KM Geo Mean	0.113
KM SD (logged)	0.602	95% Critical H Value (KM-Log)	1.963
KM Standard Error of Mean (logged)	0.138	95% H-UCL (KM -Log)	0.157
KM SD (logged)	0.602	95% Critical H Value (KM-Log)	1.963
KM Standard Error of Mean (logged)	0.138		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.57	Mean in Log Scale	-1.088
SD in Original Scale	0.558	SD in Log Scale	1.078
95% t UCL (Assumes normality)	0.691	95% H-Stat UCL	0.853
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	0.164		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | surface soil | include | aluminum | 434)			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	2260	Mean	7565
Maximum	15700	Median	6795
SD	3147	Std. Error of Mean	574.6
Coefficient of Variation	0.416	Skewness	0.597
Normal GOF Test			
Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.131	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	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	8541	95% Adjusted-CLT UCL (Chen-1995)	8577
		95% Modified-t UCL (Johnson-1978)	8551
Gamma GOF Test			
A-D Test Statistic	0.404	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.107	**Kolmogorov-Smirnov Gamma GOF Test**	

5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.497	k star (bias corrected MLE)	4.969
Theta hat (MLE)	1376	Theta star (bias corrected MLE)	1522
nu hat (MLE)	329.8	nu star (bias corrected)	298.2
MLE Mean (bias corrected)	7565	MLE Sd (bias corrected)	3393
		Approximate Chi Square Value (0.05)	259.2
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	257.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8703	95% Adjusted Gamma UCL (use when n<50)	8774
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.137	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.159	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	7.723	Mean of logged Data	8.838
Maximum of Logged Data	9.661	SD of logged Data	0.465
Assuming Lognormal Distribution			
95% H-UCL	9058	90% Chebyshev (MVUE) UCL	9663
95% Chebyshev (MVUE) UCL	10578	97.5% Chebyshev (MVUE) UCL	11848
99% Chebyshev (MVUE) UCL	14342		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8510	95% Jackknife UCL	8541
95% Standard Bootstrap UCL	8469	95% Bootstrap-t UCL	8557
95% Hall's Bootstrap UCL	8614	95% Percentile Bootstrap UCL	8528
95% BCA Bootstrap UCL	8510		
90% Chebyshev(Mean, Sd) UCL	9288	95% Chebyshev(Mean, Sd) UCL	10069
97.5% Chebyshev(Mean, Sd) UCL	11153	99% Chebyshev(Mean, Sd) UCL	13282
Suggested UCL to Use			
95% Student's-t UCL	8541		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | surface soil | include | arsenic | 436)			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	1.9	Mean	7.69
Maximum	14.6	Median	7.4
SD	3.06	Std. Error of Mean	0.559

Coefficient of Variation	0.398	Skewness	0.408
Normal GOF Test			
Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.121	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	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	8.639	95% Adjusted-CLT UCL (Chen-1995)	8.653
		95% Modified-t UCL (Johnson-1978)	8.646
Gamma GOF Test			
A-D Test Statistic	0.247	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0978	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.899	k star (bias corrected MLE)	5.331
Theta hat (MLE)	1.304	Theta star (bias corrected MLE)	1.442
nu hat (MLE)	353.9	nu star (bias corrected)	319.9
MLE Mean (bias corrected)	7.69	MLE Sd (bias corrected)	3.331
		Approximate Chi Square Value (0.05)	279.4
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	277.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8.803	95% Adjusted Gamma UCL (use when n<50)	8.872
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.124	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.159	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.642	Mean of logged Data	1.953
Maximum of Logged Data	2.681	SD of logged Data	0.45
Assuming Lognormal Distribution			
95% H-UCL	9.147	90% Chebyshev (MVUE) UCL	9.751
95% Chebyshev (MVUE) UCL	10.65	97.5% Chebyshev (MVUE) UCL	11.9
99% Chebyshev (MVUE) UCL	14.34		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8.609	95% Jackknife UCL	8.639
95% Standard Bootstrap UCL	8.595	95% Bootstrap-t UCL	8.715
95% Hall's Bootstrap UCL	8.647	95% Percentile Bootstrap UCL	8.677
95% BCA Bootstrap UCL	8.627		
90% Chebyshev(Mean, Sd) UCL	9.366	95% Chebyshev(Mean, Sd) UCL	10.13
97.5% Chebyshev(Mean, Sd) UCL	11.18	99% Chebyshev(Mean, Sd) UCL	13.25

Suggested UCL to Use			
95% Student's-t UCL	8.639		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | surface soil | include | benzo(a)pyrene | 88)			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.0014	Mean	0.0741
Maximum	0.29	Median	0.0435
SD	0.0839	Std. Error of Mean	0.0153
Coefficient of Variation	1.132	Skewness	1.352
Normal GOF Test			
Shapiro Wilk Test Statistic	0.798	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.258	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	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	0.1	95% Adjusted-CLT UCL (Chen-1995)	0.103
		95% Modified-t UCL (Johnson-1978)	0.101
Gamma GOF Test			
A-D Test Statistic	0.299	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.789	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.102	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.166	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.736	k star (bias corrected MLE)	0.685
Theta hat (MLE)	0.101	Theta star (bias corrected MLE)	0.108
nu hat (MLE)	44.15	nu star (bias corrected)	41.07
MLE Mean (bias corrected)	0.0741	MLE Sd (bias corrected)	0.0896
		Approximate Chi Square Value (0.05)	27.38
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	26.74
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.111	95% Adjusted Gamma UCL (use when n<50)	0.114
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0999	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.159	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			

Minimum of Logged Data	-6.571	Mean of logged Data	-3.417
Maximum of Logged Data	-1.238	SD of logged Data	1.504
Assuming Lognormal Distribution			
95% H-UCL	0.247	90% Chebyshev (MVUE) UCL	0.193
95% Chebyshev (MVUE) UCL	0.237	97.5% Chebyshev (MVUE) UCL	0.299
99% Chebyshev (MVUE) UCL	0.421		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0993	95% Jackknife UCL	0.1
95% Standard Bootstrap UCL	0.0993	95% Bootstrap-t UCL	0.108
95% Hall's Bootstrap UCL	0.102	95% Percentile Bootstrap UCL	0.1
95% BCA Bootstrap UCL	0.102		
90% Chebyshev(Mean, Sd) UCL	0.12	95% Chebyshev(Mean, Sd) UCL	0.141
97.5% Chebyshev(Mean, Sd) UCL	0.17	99% Chebyshev(Mean, Sd) UCL	0.227
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.114		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | surface soil | include | chromium | 441)			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	6.6	Mean	11.61
Maximum	18	Median	11.3
SD	3.106	Std. Error of Mean	0.567
Coefficient of Variation	0.267	Skewness	0.378
Normal GOF Test			
Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.109	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	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	12.58	95% Adjusted-CLT UCL (Chen-1995)	12.59
		95% Modified-t UCL (Johnson-1978)	12.58
Gamma GOF Test			
A-D Test Statistic	0.228	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0869	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			

k hat (MLE)	14.4	k star (bias corrected MLE)	12.99
Theta hat (MLE)	0.806	Theta star (bias corrected MLE)	0.894
nu hat (MLE)	864.3	nu star (bias corrected)	779.2
MLE Mean (bias corrected)	11.61	MLE Sd (bias corrected)	3.223
		Approximate Chi Square Value (0.05)	715.4
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	711.9
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	12.65	95% Adjusted Gamma UCL (use when n<50)	12.71
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0848	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.159	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.887	Mean of logged Data	2.417
Maximum of Logged Data	2.89	SD of logged Data	0.272
Assuming Lognormal Distribution			
95% H-UCL	12.74	90% Chebyshev (MVUE) UCL	13.37
95% Chebyshev (MVUE) UCL	14.17	97.5% Chebyshev (MVUE) UCL	15.27
99% Chebyshev (MVUE) UCL	17.44		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	12.55	95% Jackknife UCL	12.58
95% Standard Bootstrap UCL	12.52	95% Bootstrap-t UCL	12.62
95% Hall's Bootstrap UCL	12.58	95% Percentile Bootstrap UCL	12.58
95% BCA Bootstrap UCL	12.56		
90% Chebyshev(Mean, Sd) UCL	13.31	95% Chebyshev(Mean, Sd) UCL	14.09
97.5% Chebyshev(Mean, Sd) UCL	15.15	99% Chebyshev(Mean, Sd) UCL	17.26
Suggested UCL to Use			
95% Student's-t UCL	12.58		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | surface soil | include | cobalt | 442)			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	2.9	Mean	9.613
Maximum	23.6	Median	9.3
SD	4.549	Std. Error of Mean	0.83
Coefficient of Variation	0.473	Skewness	1.294
Normal GOF Test			
Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**	

5% Shapiro Wilk Critical Value	0.927	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	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	11.02	95% Adjusted-CLT UCL (Chen-1995)	11.19
		95% Modified-t UCL (Johnson-1978)	11.06
Gamma GOF Test			
A-D Test Statistic	0.329	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.117	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.943	k star (bias corrected MLE)	4.471
Theta hat (MLE)	1.945	Theta star (bias corrected MLE)	2.15
nu hat (MLE)	296.6	nu star (bias corrected)	268.3
MLE Mean (bias corrected)	9.613	MLE Sd (bias corrected)	4.546
		Approximate Chi Square Value (0.05)	231.3
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	229.4
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	11.15	95% Adjusted Gamma UCL (use when n<50)	11.24
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.147	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.159	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.065	Mean of logged Data	2.159
Maximum of Logged Data	3.161	SD of logged Data	0.474
Assuming Lognormal Distribution			
95% H-UCL	11.49	90% Chebyshev (MVUE) UCL	12.26
95% Chebyshev (MVUE) UCL	13.44	97.5% Chebyshev (MVUE) UCL	15.08
99% Chebyshev (MVUE) UCL	18.3		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	10.98	95% Jackknife UCL	11.02
95% Standard Bootstrap UCL	10.97	95% Bootstrap-t UCL	11.26
95% Hall's Bootstrap UCL	11.71	95% Percentile Bootstrap UCL	10.98
95% BCA Bootstrap UCL	11.15		
90% Chebyshev(Mean, Sd) UCL	12.1	95% Chebyshev(Mean, Sd) UCL	13.23
97.5% Chebyshev(Mean, Sd) UCL	14.8	99% Chebyshev(Mean, Sd) UCL	17.88
Suggested UCL to Use			
95% Student's-t UCL	11.02		

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | site-wide | surface soil | include | iron | 444)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	5700	Mean	20683
Maximum	77700	Median	15050
SD	14474	Std. Error of Mean	2643
Coefficient of Variation	0.7	Skewness	2.517

Normal GOF Test

Shapiro Wilk Test Statistic	0.742	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.21	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.159	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	25173	95% Adjusted-CLT UCL (Chen-1995)	26328
		95% Modified-t UCL (Johnson-1978)	25376

Gamma GOF Test

A-D Test Statistic	0.965	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.161	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.212	k star (bias corrected MLE)	2.913
Theta hat (MLE)	6440	Theta star (bias corrected MLE)	7100
nu hat (MLE)	192.7	nu star (bias corrected)	174.8
MLE Mean (bias corrected)	20683	MLE Sd (bias corrected)	12119
		Approximate Chi Square Value (0.05)	145.2
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	143.7

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	24896	95% Adjusted Gamma UCL (use when n<50)	25165

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.142	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.159	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.648	Mean of logged Data	9.773

Maximum of Logged Data	11.26	SD of logged Data	0.55
Assuming Lognormal Distribution			
95% H-UCL	25030	90% Chebyshev (MVUE) UCL	26740
95% Chebyshev (MVUE) UCL	29654	97.5% Chebyshev (MVUE) UCL	33699
99% Chebyshev (MVUE) UCL	41644		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	25030	95% Jackknife UCL	25173
95% Standard Bootstrap UCL	24978	95% Bootstrap-t UCL	27955
95% Hall's Bootstrap UCL	34864	95% Percentile Bootstrap UCL	25430
95% BCA Bootstrap UCL	26273		
90% Chebyshev(Mean, Sd) UCL	28611	95% Chebyshev(Mean, Sd) UCL	32202
97.5% Chebyshev(Mean, Sd) UCL	37186	99% Chebyshev(Mean, Sd) UCL	46977
Suggested UCL to Use			
95% H-UCL	25030		
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.			
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.			
Conc (so | site-wide | surface soil | include | manganese | 447)			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	50	Mean	404.4
Maximum	1140	Median	370.5
SD	219.1	Std. Error of Mean	39.99
Coefficient of Variation	0.542	Skewness	1.455
Normal GOF Test			
Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	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	472.4	95% Adjusted-CLT UCL (Chen-1995)	481.5
		95% Modified-t UCL (Johnson-1978)	474.1
Gamma GOF Test			
A-D Test Statistic	0.241	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0787	**Kolmogorov-Smirnov Gamma GOF Test**	

5% K-S Critical Value	0.161	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.588	k star (bias corrected MLE)	3.251
Theta hat (MLE)	112.7	Theta star (bias corrected MLE)	124.4
nu hat (MLE)	215.3	nu star (bias corrected)	195.1
MLE Mean (bias corrected)	404.4	MLE Sd (bias corrected)	224.3
		Approximate Chi Square Value (0.05)	163.8
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	162.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	481.7	95% Adjusted Gamma UCL (use when n<50)	486.6
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.109	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.159	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.912	Mean of logged Data	5.857
Maximum of Logged Data	7.039	SD of logged Data	0.589
Assuming Lognormal Distribution			
95% H-UCL	519.1	90% Chebyshev (MVUE) UCL	554.2
95% Chebyshev (MVUE) UCL	618.2	97.5% Chebyshev (MVUE) UCL	707
99% Chebyshev (MVUE) UCL	881.4		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	470.2	95% Jackknife UCL	472.4
95% Standard Bootstrap UCL	467.5	95% Bootstrap-t UCL	491.1
95% Hall's Bootstrap UCL	512.1	95% Percentile Bootstrap UCL	470.9
95% BCA Bootstrap UCL	479.1		
90% Chebyshev(Mean, Sd) UCL	524.4	95% Chebyshev(Mean, Sd) UCL	578.7
97.5% Chebyshev(Mean, Sd) UCL	654.2	99% Chebyshev(Mean, Sd) UCL	802.3
Suggested UCL to Use			
95% Student's-t UCL	472.4		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | surface soil | include | thallium | 454)			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	23
Number of Detects	10	Number of Non-Detects	20

Number of Distinct Detects	10	Number of Distinct Non-Detects	13
Minimum Detect	0.046	Minimum Non-Detect	0.55
Maximum Detect	0.25	Maximum Non-Detect	3.4
Variance Detects	0.00387	Percent Non-Detects	66.67%
Mean Detects	0.11	SD Detects	0.0622
Median Detects	0.0915	CV Detects	0.564
Skewness Detects	1.306	Kurtosis Detects	1.84
Mean of Logged Detects	-2.335	SD of Logged Detects	0.534
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.884	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.21	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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			
KM Mean	0.11	KM Standard Error of Mean	0.0197
KM SD	0.059	95% KM (BCA) UCL	0.144
95% KM (t) UCL	0.144	95% KM (Percentile Bootstrap) UCL	0.146
95% KM (z) UCL	0.143	95% KM Bootstrap t UCL	0.166
90% KM Chebyshev UCL	0.169	95% KM Chebyshev UCL	0.196
97.5% KM Chebyshev UCL	0.233	99% KM Chebyshev UCL	0.306
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.258	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.164	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.268	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.981	k star (bias corrected MLE)	2.854
Theta hat (MLE)	0.0277	Theta star (bias corrected MLE)	0.0387
nu hat (MLE)	79.63	nu star (bias corrected)	57.07
Mean (detects)	0.11		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.046	Mean	0.106
Maximum	0.25	Median	0.103
SD	0.0408	CV	0.384
k hat (MLE)	7.869	k star (bias corrected MLE)	7.104
Theta hat (MLE)	0.0135	Theta star (bias corrected MLE)	0.015
nu hat (MLE)	472.1	nu star (bias corrected)	426.2
Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (426.24, α)	379.4	Adjusted Chi Square Value (426.24, β)	376.8
95% Gamma Approximate UCL (use when n>=50)	0.119	95% Gamma Adjusted UCL (use when n<50)	0.12
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.11	SD (KM)	0.059
Variance (KM)	0.00348	SE of Mean (KM)	0.0197
k hat (KM)	3.496	k star (KM)	3.168
nu hat (KM)	209.7	nu star (KM)	190.1

theta hat (KM)	0.0316	theta star (KM)	0.0348
80% gamma percentile (KM)	0.156	90% gamma percentile (KM)	0.193
95% gamma percentile (KM)	0.228	99% gamma percentile (KM)	0.302
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (190.11, α)	159.2	Adjusted Chi Square Value (190.11, β)	157.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.132	95% Gamma Adjusted KM-UCL (use when n<50)	0.133
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.103	Mean in Log Scale	-2.335
SD in Original Scale	0.0397	SD in Log Scale	0.353
95% t UCL (assumes normality of ROS data)	0.115	95% Percentile Bootstrap UCL	0.116
95% BCA Bootstrap UCL	0.118	95% Bootstrap t UCL	0.117
95% H-UCL (Log ROS)	0.116		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.335	KM Geo Mean	0.0968
KM SD (logged)	0.506	95% Critical H Value (KM-Log)	1.957
KM Standard Error of Mean (logged)	0.169	95% H-UCL (KM -Log)	0.132
KM SD (logged)	0.506	95% Critical H Value (KM-Log)	1.957
KM Standard Error of Mean (logged)	0.169		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.569	Mean in Log Scale	-1.128
SD in Original Scale	0.576	SD in Log Scale	1.127
95% t UCL (Assumes normality)	0.747	95% H-Stat UCL	1.063
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	0.144		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | 1,2,4,5-tetrachlorobenzene | 53)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	9
Number of Detects	2	Number of Non-Detects	88
Number of Distinct Detects	2	Number of Distinct Non-Detects	7
Minimum Detect	0.062	Minimum Non-Detect	0.18
Maximum Detect	0.81	Maximum Non-Detect	0.25
Variance Detects	0.28	Percent Non-Detects	97.78%
Mean Detects	0.436	SD Detects	0.529
Median Detects	0.436	CV Detects	1.213

Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.496	SD of Logged Detects	1.817
Warning: Data set has only 2 Detected Values.			
This is not enough to compute meaningful or reliable statistics and estimates.			
Normal GOF Test on Detects Only			
Not Enough Data to Perform GOF Test			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0703	KM Standard Error of Mean	0.0117
KM SD	0.0784	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0897	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0895	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.105	95% KM Chebyshev UCL	0.121
97.5% KM Chebyshev UCL	0.143	99% KM Chebyshev UCL	0.187
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.881	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.495	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	3.523	nu star (bias corrected)	N/A
Mean (detects)	0.436		
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0703	SD (KM)	0.0784
Variance (KM)	0.00615	SE of Mean (KM)	0.0117
k hat (KM)	0.804	k star (KM)	0.785
nu hat (KM)	144.7	nu star (KM)	141.3
theta hat (KM)	0.0874	theta star (KM)	0.0896
80% gamma percentile (KM)	0.115	90% gamma percentile (KM)	0.172
95% gamma percentile (KM)	0.23	99% gamma percentile (KM)	0.367
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0473
Approximate Chi Square Value (141.26, α)	114.8	Adjusted Chi Square Value (141.26, β)	114.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.0865	95% Gamma Adjusted KM-UCL (use when n<50)	0.0868
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0936	Mean in Log Scale	-2.76
SD in Original Scale	0.105	SD in Log Scale	0.874
95% t UCL (assumes normality of ROS data)	0.112	95% Percentile Bootstrap UCL	0.113
95% BCA Bootstrap UCL	0.118	95% Bootstrap t UCL	0.121
95% H-UCL (Log ROS)	0.113		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.752	KM Geo Mean	0.0638
KM SD (logged)	0.269	95% Critical H Value (KM-Log)	1.731
KM Standard Error of Mean (logged)	0.0402	95% H-UCL (KM -Log)	0.0695
KM SD (logged)	0.269	95% Critical H Value (KM-Log)	1.731
KM Standard Error of Mean (logged)	0.0402		

Appendix D

Support Documentation for the Calculation of Exposure Point Concentrations (EPCs)

Human Health Risk Assessment

Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.109	Mean in Log Scale	-2.273
SD in Original Scale	0.0751	SD in Log Scale	0.235
95% t UCL (Assumes normality)	0.122	95% H-Stat UCL	0.111
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) 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.			
Conc (so | site-wide | total soil | include | aluminum | 434)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	80
		Number of Missing Observations	0
Minimum	1790	Mean	7896
Maximum	19000	Median	7640
SD	3486	Std. Error of Mean	367.5
Coefficient of Variation	0.442	Skewness	0.657
Normal GOF Test			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0186	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0569	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0936	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	8507	95% Adjusted-CLT UCL (Chen-1995)	8528
		95% Modified-t UCL (Johnson-1978)	8512
Gamma GOF Test			
A-D Test Statistic	0.615	**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	0.072	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0945	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.748	k star (bias corrected MLE)	4.598
Theta hat (MLE)	1663	Theta star (bias corrected MLE)	1718
nu hat (MLE)	854.7	nu star (bias corrected)	827.6
MLE Mean (bias corrected)	7896	MLE Sd (bias corrected)	3683
		Approximate Chi Square Value (0.05)	761.8
Adjusted Level of Significance	0.0473	Adjusted Chi Square Value	760.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8578	95% Adjusted Gamma UCL (use when n<50)	8590

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0023	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.103	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0936	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	7.49	Mean of logged Data	8.865
Maximum of Logged Data	9.852	SD of logged Data	0.497
Assuming Lognormal Distribution			
95% H-UCL	8833	90% Chebyshev (MVUE) UCL	9328
95% Chebyshev (MVUE) UCL	9929	97.5% Chebyshev (MVUE) UCL	10763
99% Chebyshev (MVUE) UCL	12402		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8501	95% Jackknife UCL	8507
95% Standard Bootstrap UCL	8501	95% Bootstrap-t UCL	8490
95% Hall's Bootstrap UCL	8526	95% Percentile Bootstrap UCL	8518
95% BCA Bootstrap UCL	8491		
90% Chebyshev(Mean, Sd) UCL	8999	95% Chebyshev(Mean, Sd) UCL	9498
97.5% Chebyshev(Mean, Sd) UCL	10192	99% Chebyshev(Mean, Sd) UCL	11553
Suggested UCL to Use			
95% Student's-t UCL	8507		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | antimony | 435)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	43
Number of Detects	43	Number of Non-Detects	47
Number of Distinct Detects	30	Number of Distinct Non-Detects	17
Minimum Detect	0.21	Minimum Non-Detect	0.82
Maximum Detect	4.4	Maximum Non-Detect	8.2
Variance Detects	0.731	Percent Non-Detects	52.22%
Mean Detects	0.948	SD Detects	0.855
Median Detects	0.88	CV Detects	0.902
Skewness Detects	2.29	Kurtosis Detects	6.64
Mean of Logged Detects	-0.372	SD of Logged Detects	0.802
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.764	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.943	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.134	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			
KM Mean	0.78	KM Standard Error of Mean	0.0906
KM SD	0.714	95% KM (BCA) UCL	0.939
95% KM (t) UCL	0.931	95% KM (Percentile Bootstrap) UCL	0.94
95% KM (z) UCL	0.929	95% KM Bootstrap t UCL	0.955
90% KM Chebyshev UCL	1.052	95% KM Chebyshev UCL	1.175
97.5% KM Chebyshev UCL	1.346	99% KM Chebyshev UCL	1.681
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.873	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.764	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.113	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.137	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)	1.718	k star (bias corrected MLE)	1.614
Theta hat (MLE)	0.552	Theta star (bias corrected MLE)	0.587
nu hat (MLE)	147.7	nu star (bias corrected)	138.8
Mean (detects)	0.948		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.731
Maximum	4.4	Median	0.592
SD	0.664	CV	0.907
k hat (MLE)	1.573	k star (bias corrected MLE)	1.528
Theta hat (MLE)	0.465	Theta star (bias corrected MLE)	0.479
nu hat (MLE)	283.2	nu star (bias corrected)	275.1
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (275.10, α)	237.7	Adjusted Chi Square Value (275.10, β)	237.1
95% Gamma Approximate UCL (use when n>=50)	0.847	95% Gamma Adjusted UCL (use when n<50)	0.849
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.78	SD (KM)	0.714
Variance (KM)	0.51	SE of Mean (KM)	0.0906
k hat (KM)	1.193	k star (KM)	1.161
nu hat (KM)	214.8	nu star (KM)	209
theta hat (KM)	0.654	theta star (KM)	0.672
80% gamma percentile (KM)	1.239	90% gamma percentile (KM)	1.731
95% gamma percentile (KM)	2.218	99% gamma percentile (KM)	3.335
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (208.95, α)	176.5	Adjusted Chi Square Value (208.95, β)	176
95% Gamma Approximate KM-UCL (use when n>=50)	0.923	95% Gamma Adjusted KM-UCL (use when n<50)	0.926
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.943	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.131	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.134	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	0.738	Mean in Log Scale	-0.538
SD in Original Scale	0.641	SD in Log Scale	0.651
95% t UCL (assumes normality of ROS data)	0.85	95% Percentile Bootstrap UCL	0.852
95% BCA Bootstrap UCL	0.883	95% Bootstrap t UCL	0.881
95% H-UCL (Log ROS)	0.826		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.543	KM Geo Mean	0.581
KM SD (logged)	0.739	95% Critical H Value (KM-Log)	2.04
KM Standard Error of Mean (logged)	0.105	95% H-UCL (KM -Log)	0.896
KM SD (logged)	0.739	95% Critical H Value (KM-Log)	2.04
KM Standard Error of Mean (logged)	0.105		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.332	Mean in Log Scale	-0.103
SD in Original Scale	1.211	SD in Log Scale	0.88
95% t UCL (Assumes normality)	1.544	95% H-Stat UCL	1.621
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 Approximate Gamma UCL	0.923	95% GROS Approximate Gamma UCL	0.847
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | arsenic | 436)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	70
		Number of Missing Observations	0
Minimum	0.7	Mean	10.46
Maximum	82.8	Median	7.75
SD	10.25	Std. Error of Mean	1.08
Coefficient of Variation	0.979	Skewness	4.545
Normal GOF Test			
Shapiro Wilk Test Statistic	0.627	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0936	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	12.26	95% Adjusted-CLT UCL (Chen-1995)	12.79
		95% Modified-t UCL (Johnson-1978)	12.34

Gamma GOF Test			
A-D Test Statistic	1.451	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.765	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.097	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0954	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.01	k star (bias corrected MLE)	1.95
Theta hat (MLE)	5.206	Theta star (bias corrected MLE)	5.365
nu hat (MLE)	361.7	nu star (bias corrected)	351
MLE Mean (bias corrected)	10.46	MLE Sd (bias corrected)	7.492
		Approximate Chi Square Value (0.05)	308.6
Adjusted Level of Significance	0.0473	Adjusted Chi Square Value	307.9
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	11.9	95% Adjusted Gamma UCL (use when n<50)	11.93
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.694	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.103	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0936	Data Not Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.357	Mean of logged Data	2.079
Maximum of Logged Data	4.416	SD of logged Data	0.725
Assuming Lognormal Distribution			
95% H-UCL	12.16	90% Chebyshev (MVUE) UCL	13
95% Chebyshev (MVUE) UCL	14.2	97.5% Chebyshev (MVUE) UCL	15.85
99% Chebyshev (MVUE) UCL	19.11		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	12.24	95% Jackknife UCL	12.26
95% Standard Bootstrap UCL	12.27	95% Bootstrap-t UCL	13.07
95% Hall's Bootstrap UCL	20.32	95% Percentile Bootstrap UCL	12.39
95% BCA Bootstrap UCL	12.81		
90% Chebyshev(Mean, Sd) UCL	13.7	95% Chebyshev(Mean, Sd) UCL	15.17
97.5% Chebyshev(Mean, Sd) UCL	17.21	99% Chebyshev(Mean, Sd) UCL	21.21
Suggested UCL to Use			
95% H-UCL	12.16		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
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.			

Conc (so | site-wide | total soil | include | benzo(a)anthracene | 87)

General Statistics

Total Number of Observations	90	Number of Distinct Observations	71
Number of Detects	82	Number of Non-Detects	8
Number of Distinct Detects	65	Number of Distinct Non-Detects	8
Minimum Detect	4.1000E-4	Minimum Non-Detect	0.0037
Maximum Detect	5.7	Maximum Non-Detect	0.22
Variance Detects	0.591	Percent Non-Detects	8.889%
Mean Detects	0.231	SD Detects	0.769
Median Detects	0.067	CV Detects	3.326
Skewness Detects	5.975	Kurtosis Detects	37.92
Mean of Logged Detects	-3.175	SD of Logged Detects	1.906

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.305	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.382	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.098	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

KM Mean	0.212	KM Standard Error of Mean	0.0776
KM SD	0.732	95% KM (BCA) UCL	0.35
95% KM (t) UCL	0.342	95% KM (Percentile Bootstrap) UCL	0.357
95% KM (z) UCL	0.34	95% KM Bootstrap t UCL	0.666
90% KM Chebyshev UCL	0.445	95% KM Chebyshev UCL	0.551
97.5% KM Chebyshev UCL	0.697	99% KM Chebyshev UCL	0.985

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.764	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.845	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.2	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.106	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)	0.387	k star (bias corrected MLE)	0.381
Theta hat (MLE)	0.597	Theta star (bias corrected MLE)	0.607
nu hat (MLE)	63.43	nu star (bias corrected)	62.45
Mean (detects)	0.231		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	4.1000E-4	Mean	0.211
Maximum	5.7	Median	0.047
SD	0.736	CV	3.481
k hat (MLE)	0.38	k star (bias corrected MLE)	0.374
Theta hat (MLE)	0.557	Theta star (bias corrected MLE)	0.565
nu hat (MLE)	68.31	nu star (bias corrected)	67.37
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (67.37, α)	49.48	Adjusted Chi Square Value (67.37, β)	49.23
95% Gamma Approximate UCL (use when n>=50)	0.288	95% Gamma Adjusted UCL (use when n<50)	0.289

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.212	SD (KM)	0.732
Variance (KM)	0.536	SE of Mean (KM)	0.0776
k hat (KM)	0.0843	k star (KM)	0.0889
nu hat (KM)	15.18	nu star (KM)	16
theta hat (KM)	2.52	theta star (KM)	2.39
80% gamma percentile (KM)	0.123	90% gamma percentile (KM)	0.535
95% gamma percentile (KM)	1.238	99% gamma percentile (KM)	3.577
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (16.00, α)	7.964	Adjusted Chi Square Value (16.00, β)	7.872
95% Gamma Approximate KM-UCL (use when n>=50)	0.427	95% Gamma Adjusted KM-UCL (use when n<50)	0.432
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.972	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.262	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.11	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.098	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.212	Mean in Log Scale	-3.356
SD in Original Scale	0.736	SD in Log Scale	1.94
95% t UCL (assumes normality of ROS data)	0.34	95% Percentile Bootstrap UCL	0.344
95% BCA Bootstrap UCL	0.41	95% Bootstrap t UCL	0.674
95% H-UCL (Log ROS)	0.453		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.384	KM Geo Mean	0.0339
KM SD (logged)	1.997	95% Critical H Value (KM-Log)	3.383
KM Standard Error of Mean (logged)	0.215	95% H-UCL (KM -Log)	0.509
KM SD (logged)	1.997	95% Critical H Value (KM-Log)	3.383
KM Standard Error of Mean (logged)	0.215		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.214	Mean in Log Scale	-3.315
SD in Original Scale	0.736	SD in Log Scale	1.959
95% t UCL (Assumes normality)	0.343	95% H-Stat UCL	0.495
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.509		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | benzo(a)pyrene | 88)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	67
Number of Detects	79	Number of Non-Detects	11

Number of Distinct Detects	59	Number of Distinct Non-Detects	10
Minimum Detect	0.0012	Minimum Non-Detect	0.0037
Maximum Detect	6.1	Maximum Non-Detect	0.22
Variance Detects	0.606	Percent Non-Detects	12.22%
Mean Detects	0.22	SD Detects	0.779
Median Detects	0.062	CV Detects	3.547
Skewness Detects	6.489	Kurtosis Detects	45.33
Mean of Logged Detects	-3.183	SD of Logged Detects	1.773
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.285	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.39	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0998	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			
KM Mean	0.196	KM Standard Error of Mean	0.0772
KM SD	0.728	95% KM (BCA) UCL	0.329
95% KM (t) UCL	0.324	95% KM (Percentile Bootstrap) UCL	0.338
95% KM (z) UCL	0.323	95% KM Bootstrap t UCL	0.731
90% KM Chebyshev UCL	0.428	95% KM Chebyshev UCL	0.533
97.5% KM Chebyshev UCL	0.678	99% KM Chebyshev UCL	0.964
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	4.401	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.843	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.211	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.108	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)	0.396	k star (bias corrected MLE)	0.389
Theta hat (MLE)	0.555	Theta star (bias corrected MLE)	0.564
nu hat (MLE)	62.51	nu star (bias corrected)	61.47
Mean (detects)	0.22		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0012	Mean	0.194
Maximum	6.1	Median	0.0405
SD	0.732	CV	3.773
k hat (MLE)	0.387	k star (bias corrected MLE)	0.382
Theta hat (MLE)	0.501	Theta star (bias corrected MLE)	0.508
nu hat (MLE)	69.74	nu star (bias corrected)	68.75
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (68.75, α)	50.66	Adjusted Chi Square Value (68.75, β)	50.41
95% Gamma Approximate UCL (use when n>=50)	0.263	95% Gamma Adjusted UCL (use when n<50)	0.265
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.196	SD (KM)	0.728
Variance (KM)	0.53	SE of Mean (KM)	0.0772
k hat (KM)	0.0726	k star (KM)	0.0776
nu hat (KM)	13.06	nu star (KM)	13.96

theta hat (KM)	2.702	theta star (KM)	2.528
80% gamma percentile (KM)	0.0877	90% gamma percentile (KM)	0.456
95% gamma percentile (KM)	1.138	99% gamma percentile (KM)	3.523
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.96, α)	6.544	Adjusted Chi Square Value (13.96, β)	6.461
95% Gamma Approximate KM-UCL (use when n>=50)	0.418	95% Gamma Adjusted KM-UCL (use when n<50)	0.424
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.969	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.179	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.105	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0998	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.195	Mean in Log Scale	-3.378
SD in Original Scale	0.732	SD in Log Scale	1.792
95% t UCL (assumes normality of ROS data)	0.323	95% Percentile Bootstrap UCL	0.328
95% BCA Bootstrap UCL	0.403	95% Bootstrap t UCL	0.74
95% H-UCL (Log ROS)	0.308		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.399	KM Geo Mean	0.0334
KM SD (logged)	1.845	95% Critical H Value (KM-Log)	3.194
KM Standard Error of Mean (logged)	0.201	95% H-UCL (KM -Log)	0.342
KM SD (logged)	1.845	95% Critical H Value (KM-Log)	3.194
KM Standard Error of Mean (logged)	0.201		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.2	Mean in Log Scale	-3.293
SD in Original Scale	0.731	SD in Log Scale	1.821
95% t UCL (Assumes normality)	0.328	95% H-Stat UCL	0.359
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.342		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | benzo(b)fluoranthene | 89)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	69
Number of Detects	82	Number of Non-Detects	8
Number of Distinct Detects	64	Number of Distinct Non-Detects	8
Minimum Detect	0.0013	Minimum Non-Detect	0.0037
Maximum Detect	9.5	Maximum Non-Detect	0.22
Variance Detects	1.515	Percent Non-Detects	8.889%
Mean Detects	0.358	SD Detects	1.231
Median Detects	0.0915	CV Detects	3.435

Skewness Detects	6.25	Kurtosis Detects	42.11
Mean of Logged Detects	-2.727	SD of Logged Detects	1.846
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.298	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.386	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.098	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			
KM Mean	0.329	KM Standard Error of Mean	0.124
KM SD	1.172	95% KM (BCA) UCL	0.583
95% KM (t) UCL	0.535	95% KM (Percentile Bootstrap) UCL	0.549
95% KM (z) UCL	0.533	95% KM Bootstrap t UCL	1.116
90% KM Chebyshev UCL	0.701	95% KM Chebyshev UCL	0.87
97.5% KM Chebyshev UCL	1.105	99% KM Chebyshev UCL	1.565
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	4.322	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.845	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.192	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.106	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)	0.389	k star (bias corrected MLE)	0.383
Theta hat (MLE)	0.922	Theta star (bias corrected MLE)	0.937
nu hat (MLE)	63.75	nu star (bias corrected)	62.75
Mean (detects)	0.358		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0013	Mean	0.327
Maximum	9.5	Median	0.076
SD	1.179	CV	3.6
k hat (MLE)	0.374	k star (bias corrected MLE)	0.369
Theta hat (MLE)	0.875	Theta star (bias corrected MLE)	0.887
nu hat (MLE)	67.36	nu star (bias corrected)	66.45
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (66.45, α)	48.69	Adjusted Chi Square Value (66.45, β)	48.44
95% Gamma Approximate UCL (use when n>=50)	0.447	95% Gamma Adjusted UCL (use when n<50)	0.449
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.329	SD (KM)	1.172
Variance (KM)	1.373	SE of Mean (KM)	0.124
k hat (KM)	0.0786	k star (KM)	0.0834
nu hat (KM)	14.16	nu star (KM)	15.02
theta hat (KM)	4.178	theta star (KM)	3.938
80% gamma percentile (KM)	0.169	90% gamma percentile (KM)	0.799
95% gamma percentile (KM)	1.914	99% gamma percentile (KM)	5.704
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (15.02, α)	7.274	Adjusted Chi Square Value (15.02, β)	7.186

95% Gamma Approximate KM-UCL (use when n>=50)	0.678	95% Gamma Adjusted KM-UCL (use when n<50)	0.687
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.966	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.119	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0922	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.098	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	0.328	Mean in Log Scale	-2.918
SD in Original Scale	1.178	SD in Log Scale	1.893
95% t UCL (assumes normality of ROS data)	0.534	95% Percentile Bootstrap UCL	0.558
95% BCA Bootstrap UCL	0.659	95% Bootstrap t UCL	1.05
95% H-UCL (Log ROS)	0.624		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.947	KM Geo Mean	0.0525
KM SD (logged)	1.945	95% Critical H Value (KM-Log)	3.318
KM Standard Error of Mean (logged)	0.209	95% H-UCL (KM -Log)	0.69
KM SD (logged)	1.945	95% Critical H Value (KM-Log)	3.318
KM Standard Error of Mean (logged)	0.209		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.33	Mean in Log Scale	-2.907
SD in Original Scale	1.178	SD in Log Scale	1.94
95% t UCL (Assumes normality)	0.536	95% H-Stat UCL	0.71
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			
KM H-UCL	0.69		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | cadmium | 439)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	46
Number of Detects	75	Number of Non-Detects	15
Number of Distinct Detects	38	Number of Distinct Non-Detects	9
Minimum Detect	0.067	Minimum Non-Detect	0.51
Maximum Detect	2.2	Maximum Non-Detect	0.63
Variance Detects	0.0957	Percent Non-Detects	16.67%
Mean Detects	0.312	SD Detects	0.309
Median Detects	0.26	CV Detects	0.991
Skewness Detects	4.173	Kurtosis Detects	21.07
Mean of Logged Detects	-1.409	SD of Logged Detects	0.647
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.579	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	

Lilliefors Test Statistic	0.256	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.102	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			
KM Mean	0.302	KM Standard Error of Mean	0.0307
KM SD	0.285	95% KM (BCA) UCL	0.359
95% KM (t) UCL	0.353	95% KM (Percentile Bootstrap) UCL	0.355
95% KM (z) UCL	0.352	95% KM Bootstrap t UCL	0.387
90% KM Chebyshev UCL	0.394	95% KM Chebyshev UCL	0.436
97.5% KM Chebyshev UCL	0.494	99% KM Chebyshev UCL	0.608
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.102	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.762	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.139	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.104	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)	2.2	k star (bias corrected MLE)	2.121
Theta hat (MLE)	0.142	Theta star (bias corrected MLE)	0.147
nu hat (MLE)	329.9	nu star (bias corrected)	318.1
Mean (detects)	0.312		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.067	Mean	0.301
Maximum	2.2	Median	0.245
SD	0.286	CV	0.95
k hat (MLE)	2.431	k star (bias corrected MLE)	2.357
Theta hat (MLE)	0.124	Theta star (bias corrected MLE)	0.128
nu hat (MLE)	437.5	nu star (bias corrected)	424.3
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (424.28, α)	377.5	Adjusted Chi Square Value (424.28, β)	376.8
95% Gamma Approximate UCL (use when n>=50)	0.338	95% Gamma Adjusted UCL (use when n<50)	0.339
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.302	SD (KM)	0.285
Variance (KM)	0.0814	SE of Mean (KM)	0.0307
k hat (KM)	1.118	k star (KM)	1.088
nu hat (KM)	201.3	nu star (KM)	195.9
theta hat (KM)	0.27	theta star (KM)	0.277
80% gamma percentile (KM)	0.482	90% gamma percentile (KM)	0.68
95% gamma percentile (KM)	0.877	99% gamma percentile (KM)	1.332
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (195.90, α)	164.5	Adjusted Chi Square Value (195.90, β)	164
95% Gamma Approximate KM-UCL (use when n>=50)	0.359	95% Gamma Adjusted KM-UCL (use when n<50)	0.36
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.953	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0216	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.102	**Lilliefors GOF Test**	

5% Lilliefors Critical Value	0.102	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	0.3	Mean in Log Scale	-1.418
SD in Original Scale	0.284	SD in Log Scale	0.599
95% t UCL (assumes normality of ROS data)	0.35	95% Percentile Bootstrap UCL	0.349
95% BCA Bootstrap UCL	0.372	95% Bootstrap t UCL	0.381
95% H-UCL (Log ROS)	0.327		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.425	KM Geo Mean	0.241
KM SD (logged)	0.624	95% Critical H Value (KM-Log)	1.933
KM Standard Error of Mean (logged)	0.0705	95% H-UCL (KM -Log)	0.332
KM SD (logged)	0.624	95% Critical H Value (KM-Log)	1.933
KM Standard Error of Mean (logged)	0.0705		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.307	Mean in Log Scale	-1.384
SD in Original Scale	0.282	SD in Log Scale	0.593
95% t UCL (Assumes normality)	0.357	95% H-Stat UCL	0.337
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.332		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | chromium | 441)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	70
		Number of Missing Observations	0
Minimum	4	Mean	13.79
Maximum	43.9	Median	12.35
SD	6.371	Std. Error of Mean	0.672
Coefficient of Variation	0.462	Skewness	2.187
Normal GOF Test			
Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	3.542E-14	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.127	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0936	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	14.9	95% Adjusted-CLT UCL (Chen-1995)	15.06
		95% Modified-t UCL (Johnson-1978)	14.93

Gamma GOF Test			
A-D Test Statistic	0.645	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0684	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0944	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	6.011	k star (bias corrected MLE)	5.818
Theta hat (MLE)	2.293	Theta star (bias corrected MLE)	2.369
nu hat (MLE)	1082	nu star (bias corrected)	1047
MLE Mean (bias corrected)	13.79	MLE Sd (bias corrected)	5.716
		Approximate Chi Square Value (0.05)	973.2
Adjusted Level of Significance	0.0473	Adjusted Chi Square Value	972
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	14.84	95% Adjusted Gamma UCL (use when n<50)	14.85
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.882	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0445	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0936	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.386	Mean of logged Data	2.538
Maximum of Logged Data	3.782	SD of logged Data	0.407
Assuming Lognormal Distribution			
95% H-UCL	14.86	90% Chebyshev (MVUE) UCL	15.57
95% Chebyshev (MVUE) UCL	16.4	97.5% Chebyshev (MVUE) UCL	17.55
99% Chebyshev (MVUE) UCL	19.82		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	14.89	95% Jackknife UCL	14.9
95% Standard Bootstrap UCL	14.89	95% Bootstrap-t UCL	15.13
95% Hall's Bootstrap UCL	15.27	95% Percentile Bootstrap UCL	14.9
95% BCA Bootstrap UCL	15.13		
90% Chebyshev(Mean, Sd) UCL	15.8	95% Chebyshev(Mean, Sd) UCL	16.71
97.5% Chebyshev(Mean, Sd) UCL	17.98	99% Chebyshev(Mean, Sd) UCL	20.47
Suggested UCL to Use			
95% Approximate Gamma UCL	14.84		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | cobalt | 442)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	70

		Number of Missing Observations	0
Minimum	1.6	Mean	9.356
Maximum	28.9	Median	8.4
SD	5.467	Std. Error of Mean	0.576
Coefficient of Variation	0.584	Skewness	1.538
Normal GOF Test			
Shapiro Wilk Test Statistic	0.868	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	4.180E-11	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0936	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	10.31	95% Adjusted-CLT UCL (Chen-1995)	10.4
		95% Modified-t UCL (Johnson-1978)	10.33
Gamma GOF Test			
A-D Test Statistic	0.52	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.758	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.08	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0947	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.413	k star (bias corrected MLE)	3.307
Theta hat (MLE)	2.741	Theta star (bias corrected MLE)	2.829
nu hat (MLE)	614.4	nu star (bias corrected)	595.2
MLE Mean (bias corrected)	9.356	MLE Sd (bias corrected)	5.145
		Approximate Chi Square Value (0.05)	539.6
Adjusted Level of Significance	0.0473	Adjusted Chi Square Value	538.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	10.32	95% Adjusted Gamma UCL (use when n<50)	10.34
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.684	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0668	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0936	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.47	Mean of logged Data	2.082
Maximum of Logged Data	3.364	SD of logged Data	0.565
Assuming Lognormal Distribution			
95% H-UCL	10.54	90% Chebyshev (MVUE) UCL	11.18
95% Chebyshev (MVUE) UCL	12	97.5% Chebyshev (MVUE) UCL	13.12
99% Chebyshev (MVUE) UCL	15.34		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	10.3	95% Jackknife UCL	10.31
95% Standard Bootstrap UCL	10.29	95% Bootstrap-t UCL	10.45

95% Hall's Bootstrap UCL	10.42	95% Percentile Bootstrap UCL	10.33
95% BCA Bootstrap UCL	10.41		
90% Chebyshev(Mean, Sd) UCL	11.08	95% Chebyshev(Mean, Sd) UCL	11.87
97.5% Chebyshev(Mean, Sd) UCL	12.95	99% Chebyshev(Mean, Sd) UCL	15.09
Suggested UCL to Use			
95% Approximate Gamma UCL	10.32		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | dibenz(a,h)anthracene | 99)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	44
Number of Detects	39	Number of Non-Detects	51
Number of Distinct Detects	34	Number of Distinct Non-Detects	11
Minimum Detect	9.5000E-4	Minimum Non-Detect	0.0037
Maximum Detect	0.71	Maximum Non-Detect	0.23
Variance Detects	0.0127	Percent Non-Detects	56.67%
Mean Detects	0.0282	SD Detects	0.113
Median Detects	0.0073	CV Detects	3.993
Skewness Detects	6.141	Kurtosis Detects	38.09
Mean of Logged Detects	-4.992	SD of Logged Detects	1.313
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.228	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.419	**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			
KM Mean	0.0169	KM Standard Error of Mean	0.00803
KM SD	0.0743	95% KM (BCA) UCL	0.0324
95% KM (t) UCL	0.0303	95% KM (Percentile Bootstrap) UCL	0.0324
95% KM (z) UCL	0.0301	95% KM Bootstrap t UCL	0.0809
90% KM Chebyshev UCL	0.041	95% KM Chebyshev UCL	0.0519
97.5% KM Chebyshev UCL	0.0671	99% KM Chebyshev UCL	0.0968
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	4.315	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.823	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.284	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.15	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)	0.453	k star (bias corrected MLE)	0.435
Theta hat (MLE)	0.0623	Theta star (bias corrected MLE)	0.0648
nu hat (MLE)	35.33	nu star (bias corrected)	33.95
Mean (detects)	0.0282		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			

For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	9.5000E-4	Mean	0.0258
Maximum	0.71	Median	0.01
SD	0.0772	CV	2.994
k hat (MLE)	0.696	k star (bias corrected MLE)	0.68
Theta hat (MLE)	0.037	Theta star (bias corrected MLE)	0.0379
nu hat (MLE)	125.3	nu star (bias corrected)	122.4
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (122.43, α)	97.88	Adjusted Chi Square Value (122.43, β)	97.52
95% Gamma Approximate UCL (use when n>=50)	0.0322	95% Gamma Adjusted UCL (use when n<50)	0.0324
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0169	SD (KM)	0.0743
Variance (KM)	0.00552	SE of Mean (KM)	0.00803
k hat (KM)	0.0519	k star (KM)	0.0576
nu hat (KM)	9.338	nu star (KM)	10.36
theta hat (KM)	0.326	theta star (KM)	0.294
80% gamma percentile (KM)	0.00362	90% gamma percentile (KM)	0.0305
95% gamma percentile (KM)	0.0939	99% gamma percentile (KM)	0.348
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (10.36, α)	4.168	Adjusted Chi Square Value (10.36, β)	4.104
95% Gamma Approximate KM-UCL (use when n>=50)	0.0421	95% Gamma Adjusted KM-UCL (use when n<50)	0.0427
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.111	**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	0.0166	Mean in Log Scale	-5.205
SD in Original Scale	0.0746	SD in Log Scale	1.158
95% t UCL (assumes normality of ROS data)	0.0296	95% Percentile Bootstrap UCL	0.0323
95% BCA Bootstrap UCL	0.0409	95% Bootstrap t UCL	0.0974
95% H-UCL (Log ROS)	0.0144		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.225	KM Geo Mean	0.00538
KM SD (logged)	1.199	95% Critical H Value (KM-Log)	2.444
KM Standard Error of Mean (logged)	0.176	95% H-UCL (KM -Log)	0.0151
KM SD (logged)	1.199	95% Critical H Value (KM-Log)	2.444
KM Standard Error of Mean (logged)	0.176		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0632	Mean in Log Scale	-3.723
SD in Original Scale	0.0835	SD in Log Scale	1.707
95% t UCL (Assumes normality)	0.0779	95% H-Stat UCL	0.179
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			

KM H-UCL	0.0151		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | dieldrin | 130)			
General Statistics			
Total Number of Observations	85	Number of Distinct Observations	25
Number of Detects	16	Number of Non-Detects	69
Number of Distinct Detects	16	Number of Distinct Non-Detects	11
Minimum Detect	5.2000E-4	Minimum Non-Detect	0.0035
Maximum Detect	0.75	Maximum Non-Detect	0.0046
Variance Detects	0.0347	Percent Non-Detects	81.18%
Mean Detects	0.052	SD Detects	0.186
Median Detects	0.0039	CV Detects	3.579
Skewness Detects	3.994	Kurtosis Detects	15.97
Mean of Logged Detects	-5.318	SD of Logged Detects	1.669
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.294	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.502	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	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			
KM Mean	0.0113	KM Standard Error of Mean	0.00904
KM SD	0.0807	95% KM (BCA) UCL	0.0293
95% KM (t) UCL	0.0263	95% KM (Percentile Bootstrap) UCL	0.0288
95% KM (z) UCL	0.0261	95% KM Bootstrap t UCL	0.286
90% KM Chebyshev UCL	0.0384	95% KM Chebyshev UCL	0.0507
97.5% KM Chebyshev UCL	0.0677	99% KM Chebyshev UCL	0.101
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	3.014	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.841	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.389	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.233	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)	0.293	k star (bias corrected MLE)	0.28
Theta hat (MLE)	0.178	Theta star (bias corrected MLE)	0.186
nu hat (MLE)	9.377	nu star (bias corrected)	8.952
Mean (detects)	0.052		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	5.2000E-4	Mean	0.0181
Maximum	0.75	Median	0.01
SD	0.0804	CV	4.446

k hat (MLE)	0.826	k star (bias corrected MLE)	0.804
Theta hat (MLE)	0.0219	Theta star (bias corrected MLE)	0.0225
nu hat (MLE)	140.4	nu star (bias corrected)	136.8
Adjusted Level of Significance (β)	0.0472		
Approximate Chi Square Value (136.76, α)	110.7	Adjusted Chi Square Value (136.76, β)	110.3
95% Gamma Approximate UCL (use when n>=50)	0.0223	95% Gamma Adjusted UCL (use when n<50)	0.0224
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0113	SD (KM)	0.0807
Variance (KM)	0.0065	SE of Mean (KM)	0.00904
k hat (KM)	0.0195	k star (KM)	0.0266
nu hat (KM)	3.309	nu star (KM)	4.525
theta hat (KM)	0.578	theta star (KM)	0.423
80% gamma percentile (KM)	5.5509E-5	90% gamma percentile (KM)	0.00468
95% gamma percentile (KM)	0.0385	99% gamma percentile (KM)	0.299
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (4.53, α)	0.94	Adjusted Chi Square Value (4.53, β)	0.913
95% Gamma Approximate KM-UCL (use when n>=50)	0.0542	95% Gamma Adjusted KM-UCL (use when n<50)	0.0558
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.189	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	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	0.0114	Mean in Log Scale	-6.329
SD in Original Scale	0.0811	SD in Log Scale	1.148
95% t UCL (assumes normality of ROS data)	0.026	95% Percentile Bootstrap UCL	0.0288
95% BCA Bootstrap UCL	0.038	95% Bootstrap t UCL	0.381
95% H-UCL (Log ROS)	0.00464		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.258	KM Geo Mean	0.00192
KM SD (logged)	0.99	95% Critical H Value (KM-Log)	2.228
KM Standard Error of Mean (logged)	0.214	95% H-UCL (KM -Log)	0.00397
KM SD (logged)	0.99	95% Critical H Value (KM-Log)	2.228
KM Standard Error of Mean (logged)	0.214		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0114	Mean in Log Scale	-6.062
SD in Original Scale	0.0811	SD in Log Scale	0.794
95% t UCL (Assumes normality)	0.026	95% H-Stat UCL	0.00381
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.00397		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Conc (so | site-wide | total soil | include | indeno(1,2,3-cd)pyrene | 111)

General Statistics

Total Number of Observations	90	Number of Distinct Observations	73
Number of Detects	79	Number of Non-Detects	11
Number of Distinct Detects	66	Number of Distinct Non-Detects	10
Minimum Detect	8.1000E-4	Minimum Non-Detect	0.0037
Maximum Detect	1.7	Maximum Non-Detect	0.22
Variance Detects	0.0699	Percent Non-Detects	12.22%
Mean Detects	0.101	SD Detects	0.264
Median Detects	0.033	CV Detects	2.63
Skewness Detects	4.997	Kurtosis Detects	26.61
Mean of Logged Detects	-3.753	SD of Logged Detects	1.754

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.385	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.353	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0998	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

KM Mean	0.0907	KM Standard Error of Mean	0.0263
KM SD	0.248	95% KM (BCA) UCL	0.141
95% KM (t) UCL	0.134	95% KM (Percentile Bootstrap) UCL	0.137
95% KM (z) UCL	0.134	95% KM Bootstrap t UCL	0.197
90% KM Chebyshev UCL	0.17	95% KM Chebyshev UCL	0.205
97.5% KM Chebyshev UCL	0.255	99% KM Chebyshev UCL	0.352

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.933	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.832	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.17	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.107	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)	0.444	k star (bias corrected MLE)	0.436
Theta hat (MLE)	0.226	Theta star (bias corrected MLE)	0.231
nu hat (MLE)	70.22	nu star (bias corrected)	68.89
Mean (detects)	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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	8.1000E-4	Mean	0.0899
Maximum	1.7	Median	0.026
SD	0.249	CV	2.773
k hat (MLE)	0.451	k star (bias corrected MLE)	0.443
Theta hat (MLE)	0.199	Theta star (bias corrected MLE)	0.203
nu hat (MLE)	81.2	nu star (bias corrected)	79.82
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (79.82, α)	60.24	Adjusted Chi Square Value (79.82, β)	59.96

95% Gamma Approximate UCL (use when n>=50)	0.119	95% Gamma Adjusted UCL (use when n<50)	0.12
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0907	SD (KM)	0.248
Variance (KM)	0.0614	SE of Mean (KM)	0.0263
k hat (KM)	0.134	k star (KM)	0.137
nu hat (KM)	24.11	nu star (KM)	24.64
theta hat (KM)	0.677	theta star (KM)	0.662
80% gamma percentile (KM)	0.0911	90% gamma percentile (KM)	0.265
95% gamma percentile (KM)	0.508	99% gamma percentile (KM)	1.225
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (24.64, α)	14.34	Adjusted Chi Square Value (24.64, β)	14.21
95% Gamma Approximate KM-UCL (use when n>=50)	0.156	95% Gamma Adjusted KM-UCL (use when n<50)	0.157
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.965	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.11	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0998	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0895	Mean in Log Scale	-3.911
SD in Original Scale	0.249	SD in Log Scale	1.736
95% t UCL (assumes normality of ROS data)	0.133	95% Percentile Bootstrap UCL	0.132
95% BCA Bootstrap UCL	0.152	95% Bootstrap t UCL	0.196
95% H-UCL (Log ROS)	0.159		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.932	KM Geo Mean	0.0196
KM SD (logged)	1.792	95% Critical H Value (KM-Log)	3.128
KM Standard Error of Mean (logged)	0.196	95% H-UCL (KM -Log)	0.177
KM SD (logged)	1.792	95% Critical H Value (KM-Log)	3.128
KM Standard Error of Mean (logged)	0.196		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0951	Mean in Log Scale	-3.794
SD in Original Scale	0.249	SD in Log Scale	1.784
95% t UCL (Assumes normality)	0.139	95% H-Stat UCL	0.199
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.177		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | iron | 444)			
General Statistics			

Appendix D
Support Documentation for the Calculation of Exposure Point Concentrations (EPCs)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Total Number of Observations	89	Number of Distinct Observations	74
		Number of Missing Observations	0
Minimum	5300	Mean	20330
Maximum	77700	Median	17700
SD	11600	Std. Error of Mean	1230
Coefficient of Variation	0.571	Skewness	2.27
Normal GOF Test			
Shapiro Wilk Test Statistic	0.814	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	2.220E-16	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0941	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	22374	95% Adjusted-CLT UCL (Chen-1995)	22669
		95% Modified-t UCL (Johnson-1978)	22423
Gamma GOF Test			
A-D Test Statistic	1.204	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.124	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0951	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.193	k star (bias corrected MLE)	4.059
Theta hat (MLE)	4849	Theta star (bias corrected MLE)	5008
nu hat (MLE)	746.4	nu star (bias corrected)	722.5
MLE Mean (bias corrected)	20330	MLE Sd (bias corrected)	10091
		Approximate Chi Square Value (0.05)	661.2
Adjusted Level of Significance	0.0473	Adjusted Chi Square Value	660.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	22217	95% Adjusted Gamma UCL (use when n<50)	22249
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.717	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0921	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0941	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	8.575	Mean of logged Data	9.796
Maximum of Logged Data	11.26	SD of logged Data	0.487
Assuming Lognormal Distribution			
95% H-UCL	22241	90% Chebyshev (MVUE) UCL	23474
95% Chebyshev (MVUE) UCL	24962	97.5% Chebyshev (MVUE) UCL	27028
99% Chebyshev (MVUE) UCL	31086		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	22352	95% Jackknife UCL	22374

95% Standard Bootstrap UCL	22347	95% Bootstrap-t UCL	22928
95% Hall's Bootstrap UCL	22865	95% Percentile Bootstrap UCL	22435
95% BCA Bootstrap UCL	22738		
90% Chebyshev(Mean, Sd) UCL	24019	95% Chebyshev(Mean, Sd) UCL	25690
97.5% Chebyshev(Mean, Sd) UCL	28009	99% Chebyshev(Mean, Sd) UCL	32565
Suggested UCL to Use			
95% Student's-t UCL	22374	or 95% Modified-t UCL	22423
or 95% H-UCL	22241		
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.			
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.			
Conc (so | site-wide | total soil | include | manganese | 447)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	81
		Number of Missing Observations	0
Minimum	32.3	Mean	371.1
Maximum	2630	Median	310
SD	319.2	Std. Error of Mean	33.65
Coefficient of Variation	0.86	Skewness	4.312
Normal GOF Test			
Shapiro Wilk Test Statistic	0.686	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0936	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	427.1	95% Adjusted-CLT UCL (Chen-1995)	442.8
		95% Modified-t UCL (Johnson-1978)	429.6
Gamma GOF Test			
A-D Test Statistic	0.682	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.764	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0812	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0953	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.189	k star (bias corrected MLE)	2.124
Theta hat (MLE)	169.5	Theta star (bias corrected MLE)	174.7
nu hat (MLE)	394.1	nu star (bias corrected)	382.3
MLE Mean (bias corrected)	371.1	MLE Sd (bias corrected)	254.7
		Approximate Chi Square Value (0.05)	338
Adjusted Level of Significance	0.0473	Adjusted Chi Square Value	337.3

Appendix D
Support Documentation for the Calculation of Exposure Point Concentrations (EPCs)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	419.8	95% Adjusted Gamma UCL (use when n<50)	420.6
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.222	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0896	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0936	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.475	Mean of logged Data	5.671
Maximum of Logged Data	7.875	SD of logged Data	0.722
Assuming Lognormal Distribution			
95% H-UCL	440.2	90% Chebyshev (MVUE) UCL	470.7
95% Chebyshev (MVUE) UCL	513.8	97.5% Chebyshev (MVUE) UCL	573.6
99% Chebyshev (MVUE) UCL	691.1		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	426.5	95% Jackknife UCL	427.1
95% Standard Bootstrap UCL	425.5	95% Bootstrap-t UCL	447.5
95% Hall's Bootstrap UCL	670.6	95% Percentile Bootstrap UCL	426.3
95% BCA Bootstrap UCL	449.4		
90% Chebyshev(Mean, Sd) UCL	472.1	95% Chebyshev(Mean, Sd) UCL	517.8
97.5% Chebyshev(Mean, Sd) UCL	581.3	99% Chebyshev(Mean, Sd) UCL	705.9
Suggested UCL to Use			
95% Approximate Gamma UCL	419.8		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | thallium | 454)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	48
Number of Detects	29	Number of Non-Detects	61
Number of Distinct Detects	26	Number of Distinct Non-Detects	22
Minimum Detect	0.038	Minimum Non-Detect	0.51
Maximum Detect	0.42	Maximum Non-Detect	3.4
Variance Detects	0.00789	Percent Non-Detects	67.78%
Mean Detects	0.136	SD Detects	0.0888
Median Detects	0.12	CV Detects	0.655
Skewness Detects	1.689	Kurtosis Detects	3.113
Mean of Logged Detects	-2.173	SD of Logged Detects	0.591
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.841	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.161	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			
KM Mean	0.136	KM Standard Error of Mean	0.0165
KM SD	0.0873	95% KM (BCA) UCL	0.164
95% KM (t) UCL	0.163	95% KM (Percentile Bootstrap) UCL	0.166
95% KM (z) UCL	0.163	95% KM Bootstrap t UCL	0.171
90% KM Chebyshev UCL	0.185	95% KM Chebyshev UCL	0.207
97.5% KM Chebyshev UCL	0.239	99% KM Chebyshev UCL	0.3
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.359	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0915	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.164	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.024	k star (bias corrected MLE)	2.734
Theta hat (MLE)	0.0448	Theta star (bias corrected MLE)	0.0496
nu hat (MLE)	175.4	nu star (bias corrected)	158.6
Mean (detects)	0.136		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.033	Mean	0.13
Maximum	0.42	Median	0.121
SD	0.0675	CV	0.519
k hat (MLE)	4.139	k star (bias corrected MLE)	4.008
Theta hat (MLE)	0.0314	Theta star (bias corrected MLE)	0.0324
nu hat (MLE)	745	nu star (bias corrected)	721.5
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (721.48, α)	660.2	Adjusted Chi Square Value (721.48, β)	659.2
95% Gamma Approximate UCL (use when n>=50)	0.142	95% Gamma Adjusted UCL (use when n<50)	0.142
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.136	SD (KM)	0.0873
Variance (KM)	0.00761	SE of Mean (KM)	0.0165
k hat (KM)	2.414	k star (KM)	2.341
nu hat (KM)	434.6	nu star (KM)	421.4
theta hat (KM)	0.0562	theta star (KM)	0.0579
80% gamma percentile (KM)	0.199	90% gamma percentile (KM)	0.254
95% gamma percentile (KM)	0.306	99% gamma percentile (KM)	0.42
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (421.45, α)	374.9	Adjusted Chi Square Value (421.45, β)	374.1
95% Gamma Approximate KM-UCL (use when n>=50)	0.152	95% Gamma Adjusted KM-UCL (use when n<50)	0.153
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0776	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.161	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	0.127	Mean in Log Scale	-2.173
SD in Original Scale	0.0637	SD in Log Scale	0.459
95% t UCL (assumes normality of ROS data)	0.138	95% Percentile Bootstrap UCL	0.138
95% BCA Bootstrap UCL	0.139	95% Bootstrap t UCL	0.139
95% H-UCL (Log ROS)	0.138		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.173	KM Geo Mean	0.114
KM SD (logged)	0.581	95% Critical H Value (KM-Log)	1.9
KM Standard Error of Mean (logged)	0.11	95% H-UCL (KM -Log)	0.152
KM SD (logged)	0.581	95% Critical H Value (KM-Log)	1.9
KM Standard Error of Mean (logged)	0.11		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.568	Mean in Log Scale	-1.078
SD in Original Scale	0.55	SD in Log Scale	1.056
95% t UCL (Assumes normality)	0.664	95% H-Stat UCL	0.768
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 Approximate Gamma UCL	0.152	95% GROS Approximate Gamma UCL	0.142
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | aroclor 1254 | 148)			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	21
Number of Detects	2	Number of Non-Detects	29
Number of Distinct Detects	2	Number of Distinct Non-Detects	19
Minimum Detect	0.053	Minimum Non-Detect	0.038
Maximum Detect	0.551	Maximum Non-Detect	0.333
Variance Detects	0.124	Percent Non-Detects	93.55%
Mean Detects	0.302	SD Detects	0.352
Median Detects	0.302	CV Detects	1.166
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.767	SD of Logged Detects	1.656
Warning: Data set has only 2 Detected Values.			
This is not enough to compute meaningful or reliable statistics and estimates.			
Normal GOF Test on Detects Only			
Not Enough Data to Perform GOF Test			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0559	KM Standard Error of Mean	0.023
KM SD	0.0905	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.095	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0937	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.125	95% KM Chebyshev UCL	0.156

97.5% KM Chebyshev UCL	0.2	99% KM Chebyshev UCL	0.285
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.012	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.298	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	4.049	nu star (bias corrected)	N/A
Mean (detects)	0.302		
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0559	SD (KM)	0.0905
Variance (KM)	0.00819	SE of Mean (KM)	0.023
k hat (KM)	0.381	k star (KM)	0.366
nu hat (KM)	23.63	nu star (KM)	22.68
theta hat (KM)	0.147	theta star (KM)	0.153
80% gamma percentile (KM)	0.0891	90% gamma percentile (KM)	0.16
95% gamma percentile (KM)	0.239	99% gamma percentile (KM)	0.44
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0413
Approximate Chi Square Value (22.68, α)	12.85	Adjusted Chi Square Value (22.68, β)	12.43
95% Gamma Approximate KM-UCL (use when n>=50)	0.0986	95% Gamma Adjusted KM-UCL (use when n<50)	0.102
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0202	Mean in Log Scale	-7.534
SD in Original Scale	0.099	SD in Log Scale	1.974
95% t UCL (assumes normality of ROS data)	0.0503	95% Percentile Bootstrap UCL	0.0555
95% BCA Bootstrap UCL	0.0737	95% Bootstrap t UCL	1.844
95% H-UCL (Log ROS)	0.0146		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.155	KM Geo Mean	0.0427
KM SD (logged)	0.477	95% Critical H Value (KM-Log)	1.91
KM Standard Error of Mean (logged)	0.125	95% H-UCL (KM -Log)	0.0564
KM SD (logged)	0.477	95% Critical H Value (KM-Log)	1.91
KM Standard Error of Mean (logged)	0.125		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.115	Mean in Log Scale	-2.552
SD in Original Scale	0.1	SD in Log Scale	0.988
95% t UCL (Assumes normality)	0.146	95% H-Stat UCL	0.196
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.156		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | near surface soil | include | aroclor 1260 | 149)			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	24	Number of Non-Detects	7
Number of Distinct Detects	24	Number of Distinct Non-Detects	7
Minimum Detect	0.028	Minimum Non-Detect	0.039
Maximum Detect	24	Maximum Non-Detect	0.352
Variance Detects	23.31	Percent Non-Detects	22.58%
Mean Detects	1.49	SD Detects	4.828
Median Detects	0.325	CV Detects	3.24
Skewness Detects	4.792	Kurtosis Detects	23.25
Mean of Logged Detects	-1.112	SD of Logged Detects	1.496
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.296	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.408	**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			
KM Mean	1.177	KM Standard Error of Mean	0.77
KM SD	4.199	95% KM (BCA) UCL	2.742
95% KM (t) UCL	2.485	95% KM (Percentile Bootstrap) UCL	2.688
95% KM (z) UCL	2.445	95% KM Bootstrap t UCL	10.43
90% KM Chebyshev UCL	3.489	95% KM Chebyshev UCL	4.536
97.5% KM Chebyshev UCL	5.989	99% KM Chebyshev UCL	8.843
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.24	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.822	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.227	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.19	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)	0.43	k star (bias corrected MLE)	0.404
Theta hat (MLE)	3.463	Theta star (bias corrected MLE)	3.686
nu hat (MLE)	20.66	nu star (bias corrected)	19.41
Mean (detects)	1.49		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1.156
Maximum	24	Median	0.16
SD	4.274	CV	3.697
k hat (MLE)	0.332	k star (bias corrected MLE)	0.321
Theta hat (MLE)	3.486	Theta star (bias corrected MLE)	3.601
nu hat (MLE)	20.56	nu star (bias corrected)	19.9
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (19.90, α)	10.78	Adjusted Chi Square Value (19.90, β)	10.4

95% Gamma Approximate UCL (use when n>=50)	2.134	95% Gamma Adjusted UCL (use when n<50)	2.211
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.177	SD (KM)	4.199
Variance (KM)	17.63	SE of Mean (KM)	0.77
k hat (KM)	0.0786	k star (KM)	0.0925
nu hat (KM)	4.875	nu star (KM)	5.737
theta hat (KM)	14.97	theta star (KM)	12.73
80% gamma percentile (KM)	0.726	90% gamma percentile (KM)	3.026
95% gamma percentile (KM)	6.856	99% gamma percentile (KM)	19.44
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (5.74, α)	1.507	Adjusted Chi Square Value (5.74, β)	1.391
95% Gamma Approximate KM-UCL (use when n>=50)	4.483	95% Gamma Adjusted KM-UCL (use when n<50)	4.857
95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)			
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0906	**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	1.174	Mean in Log Scale	-1.441
SD in Original Scale	4.269	SD in Log Scale	1.483
95% t UCL (assumes normality of ROS data)	2.475	95% Percentile Bootstrap UCL	2.674
95% BCA Bootstrap UCL	3.562	95% Bootstrap t UCL	10.86
95% H-UCL (Log ROS)	1.623		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.437	KM Geo Mean	0.238
KM SD (logged)	1.47	95% Critical H Value (KM-Log)	3.035
KM Standard Error of Mean (logged)	0.279	95% H-UCL (KM -Log)	1.582
KM SD (logged)	1.47	95% Critical H Value (KM-Log)	3.035
KM Standard Error of Mean (logged)	0.279		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.184	Mean in Log Scale	-1.354
SD in Original Scale	4.267	SD in Log Scale	1.43
95% t UCL (Assumes normality)	2.484	95% H-Stat UCL	1.562
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			
KM H-UCL	1.582		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
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Appendix D
Support Documentation for the Calculation of Exposure Point Concentrations (EPCs)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	4.6506E-7	Mean	9.1678E-6
Maximum	9.0042E-5	Median	4.1561E-6
SD	1.4563E-5	Std. Error of Mean	2.1020E-6
Coefficient of Variation	N/A	Skewness	4.139
Normal GOF Test			
Shapiro Wilk Test Statistic	0.557	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.275	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	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	1.2695E-5	95% Adjusted-CLT UCL (Chen-1995)	1.3967E-5
		95% Modified-t UCL (Johnson-1978)	1.2904E-5
Gamma GOF Test			
A-D Test Statistic	1.146	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.786	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.136	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.867	k star (bias corrected MLE)	0.827
Theta hat (MLE)	1.0574E-5	Theta star (bias corrected MLE)	1.1089E-5
nu hat (MLE)	83.23	nu star (bias corrected)	79.37
MLE Mean (bias corrected)	9.1678E-6	MLE Sd (bias corrected)	1.0083E-5
		Approximate Chi Square Value (0.05)	59.84
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	59.31
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.2159E-5	95% Adjusted Gamma UCL (use when n<50)	1.2267E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0656	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-14.58	Mean of logged Data	-12.28
Maximum of Logged Data	-9.315	SD of logged Data	1.147
Assuming Lognormal Distribution			
95% H-UCL	1.3649E-5	90% Chebyshev (MVUE) UCL	1.4111E-5
95% Chebyshev (MVUE) UCL	1.6520E-5	97.5% Chebyshev (MVUE) UCL	1.9863E-5
99% Chebyshev (MVUE) UCL	2.6430E-5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			

95% CLT UCL	1.2625E-5	95% Jackknife UCL	1.2695E-5
95% Standard Bootstrap UCL	1.2516E-5	95% Bootstrap-t UCL	1.6410E-5
95% Hall's Bootstrap UCL	2.8163E-5	95% Percentile Bootstrap UCL	1.2762E-5
95% BCA Bootstrap UCL	1.4155E-5		
90% Chebyshev(Mean, Sd) UCL	1.5474E-5	95% Chebyshev(Mean, Sd) UCL	1.8330E-5
97.5% Chebyshev(Mean, Sd) UCL	2.2295E-5	99% Chebyshev(Mean, Sd) UCL	3.0082E-5

Suggested UCL to Use

95% H-UCL	1.3649E-5		

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.

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.

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General Statistics

Total Number of Observations	60	Number of Distinct Observations	60
		Number of Missing Observations	0
Minimum	6.3800E-8	Mean	1.5193E-5
Maximum	1.1331E-4	Median	5.2506E-6
SD	2.3935E-5	Std. Error of Mean	3.0900E-6
Coefficient of Variation	N/A	Skewness	2.399

Normal GOF Test

Shapiro Wilk Test Statistic	0.659	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.264	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.114	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	2.0357E-5	95% Adjusted-CLT UCL (Chen-1995)	2.1298E-5
		95% Modified-t UCL (Johnson-1978)	2.0516E-5

Gamma GOF Test

A-D Test Statistic	0.651	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.819	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0926	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.122	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.488	k star (bias corrected MLE)	0.475
Theta hat (MLE)	3.1123E-5	Theta star (bias corrected MLE)	3.1994E-5
nu hat (MLE)	58.58	nu star (bias corrected)	56.98
MLE Mean (bias corrected)	1.5193E-5	MLE Sd (bias corrected)	2.2048E-5
		Approximate Chi Square Value (0.05)	40.63
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	40.29

Appendix D
Support Documentation for the Calculation of Exposure Point Concentrations (EPCs)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	2.1307E-5	95% Adjusted Gamma UCL (use when n<50)	2.1487E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0908	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.075	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.114	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-16.57	Mean of logged Data	-12.4
Maximum of Logged Data	-9.085	SD of logged Data	1.91
Assuming Lognormal Distribution			
95% H-UCL	6.5023E-5	90% Chebyshev (MVUE) UCL	4.9213E-5
95% Chebyshev (MVUE) UCL	6.0830E-5	97.5% Chebyshev (MVUE) UCL	7.6955E-5
99% Chebyshev (MVUE) UCL	1.0863E-4		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	2.0276E-5	95% Jackknife UCL	2.0357E-5
95% Standard Bootstrap UCL	2.0227E-5	95% Bootstrap-t UCL	2.1861E-5
95% Hall's Bootstrap UCL	2.1472E-5	95% Percentile Bootstrap UCL	2.0517E-5
95% BCA Bootstrap UCL	2.1364E-5		
90% Chebyshev(Mean, Sd) UCL	2.4463E-5	95% Chebyshev(Mean, Sd) UCL	2.8662E-5
97.5% Chebyshev(Mean, Sd) UCL	3.4490E-5	99% Chebyshev(Mean, Sd) UCL	4.5939E-5
Suggested UCL to Use			
95% Adjusted Gamma UCL	2.1487E-5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
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General Statistics			
Total Number of Observations	9	Number of Distinct Observations	9
Number of Detects	8	Number of Non-Detects	1
Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	0.028	Minimum Non-Detect	0.039
Maximum Detect	1.6	Maximum Non-Detect	0.039
Variance Detects	0.278	Percent Non-Detects	11.11%
Mean Detects	0.333	SD Detects	0.527
Median Detects	0.125	CV Detects	1.581
Skewness Detects	2.531	Kurtosis Detects	6.643
Mean of Logged Detects	-1.89	SD of Logged Detects	1.277
Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).			
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1			
Normal GOF Test on Detects Only			

Shapiro Wilk Test Statistic	0.62	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.317	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	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			
KM Mean	0.299	KM Standard Error of Mean	0.169
KM SD	0.475	95% KM (BCA) UCL	0.622
95% KM (t) UCL	0.614	95% KM (Percentile Bootstrap) UCL	0.583
95% KM (z) UCL	0.578	95% KM Bootstrap t UCL	1.659
90% KM Chebyshev UCL	0.807	95% KM Chebyshev UCL	1.037
97.5% KM Chebyshev UCL	1.356	99% KM Chebyshev UCL	1.982
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.517	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.2	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.304	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)	0.756	k star (bias corrected MLE)	0.556
Theta hat (MLE)	0.441	Theta star (bias corrected MLE)	0.6
nu hat (MLE)	12.1	nu star (bias corrected)	8.893
Mean (detects)	0.333		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.297
Maximum	1.6	Median	0.09
SD	0.505	CV	1.697
k hat (MLE)	0.627	k star (bias corrected MLE)	0.492
Theta hat (MLE)	0.474	Theta star (bias corrected MLE)	0.604
nu hat (MLE)	11.29	nu star (bias corrected)	8.86
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (8.86, α)	3.242	Adjusted Chi Square Value (8.86, β)	2.568
95% Gamma Approximate UCL (use when n>=50)	0.813	95% Gamma Adjusted UCL (use when n<50)	1.026
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.299	SD (KM)	0.475
Variance (KM)	0.225	SE of Mean (KM)	0.169
k hat (KM)	0.398	k star (KM)	0.339
nu hat (KM)	7.165	nu star (KM)	6.11
theta hat (KM)	0.752	theta star (KM)	0.882
80% gamma percentile (KM)	0.472	90% gamma percentile (KM)	0.869
95% gamma percentile (KM)	1.316	99% gamma percentile (KM)	2.46
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (6.11, α)	1.696	Adjusted Chi Square Value (6.11, β)	1.254
95% Gamma Approximate KM-UCL (use when n>=50)	1.079	95% Gamma Adjusted KM-UCL (use when n<50)	1.46
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk GOF Test**	

5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	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	0.298	Mean in Log Scale	-2.125
SD in Original Scale	0.504	SD in Log Scale	1.388
95% t UCL (assumes normality of ROS data)	0.611	95% Percentile Bootstrap UCL	0.588
95% BCA Bootstrap UCL	0.791	95% Bootstrap t UCL	1.587
95% H-UCL (Log ROS)	2.411		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.077	KM Geo Mean	0.125
KM SD (logged)	1.245	95% Critical H Value (KM-Log)	3.807
KM Standard Error of Mean (logged)	0.444	95% H-UCL (KM -Log)	1.453
KM SD (logged)	1.245	95% Critical H Value (KM-Log)	3.807
KM Standard Error of Mean (logged)	0.444		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.299	Mean in Log Scale	-2.117
SD in Original Scale	0.504	SD in Log Scale	1.376
95% t UCL (Assumes normality)	0.611	95% H-Stat UCL	2.312
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 Bootstrap t UCL	1.659	ma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	1.46
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
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General Statistics			
Total Number of Observations	24	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	9.4126E-7	Mean	1.3068E-5
Maximum	9.0042E-5	Median	5.1471E-6
SD	1.9278E-5	Std. Error of Mean	3.9352E-6
Coefficient of Variation	N/A	Skewness	3.152
Normal GOF Test			
Shapiro Wilk Test Statistic	0.61	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.265	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	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	1.9812E-5	95% Adjusted-CLT UCL (Chen-1995)	2.2246E-5

		95% Modified-t UCL (Johnson-1978)	2.0234E-5
Gamma GOF Test			
A-D Test Statistic	0.685	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.779	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.168	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.184	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.84	k star (bias corrected MLE)	0.763
Theta hat (MLE)	1.5560E-5	Theta star (bias corrected MLE)	1.7135E-5
nu hat (MLE)	40.31	nu star (bias corrected)	36.61
MLE Mean (bias corrected)	1.3068E-5	MLE Sd (bias corrected)	1.4964E-5
		Approximate Chi Square Value (0.05)	23.76
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	23.03
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	2.0135E-5	95% Adjusted Gamma UCL (use when n<50)	2.0772E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.121	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-13.88	Mean of logged Data	-11.95
Maximum of Logged Data	-9.315	SD of logged Data	1.2
Assuming Lognormal Distribution			
95% H-UCL	2.6958E-5	90% Chebyshev (MVUE) UCL	2.3626E-5
95% Chebyshev (MVUE) UCL	2.8582E-5	97.5% Chebyshev (MVUE) UCL	3.5460E-5
99% Chebyshev (MVUE) UCL	4.8972E-5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.9540E-5	95% Jackknife UCL	1.9812E-5
95% Standard Bootstrap UCL	1.9494E-5	95% Bootstrap-t UCL	2.8088E-5
95% Hall's Bootstrap UCL	4.8918E-5	95% Percentile Bootstrap UCL	1.9568E-5
95% BCA Bootstrap UCL	2.3394E-5		
90% Chebyshev(Mean, Sd) UCL	2.4873E-5	95% Chebyshev(Mean, Sd) UCL	3.0221E-5
97.5% Chebyshev(Mean, Sd) UCL	3.7643E-5	99% Chebyshev(Mean, Sd) UCL	5.2222E-5
Suggested UCL to Use			
95% Adjusted Gamma UCL	2.0772E-5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
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Appendix D
Support Documentation for the Calculation of Exposure Point Concentrations (EPCs)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

General Statistics			
Total Number of Observations	30	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	8.3200E-8	Mean	1.7278E-5
Maximum	1.1331E-4	Median	6.3889E-6
SD	2.6598E-5	Std. Error of Mean	4.8560E-6
Coefficient of Variation	N/A	Skewness	2.41
Normal GOF Test			
Shapiro Wilk Test Statistic	0.664	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	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	2.5529E-5	95% Adjusted-CLT UCL (Chen-1995)	2.7548E-5
		95% Modified-t UCL (Johnson-1978)	2.5885E-5
Gamma GOF Test			
A-D Test Statistic	0.292	**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	0.0998	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.169	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.519	k star (bias corrected MLE)	0.489
Theta hat (MLE)	3.3287E-5	Theta star (bias corrected MLE)	3.5306E-5
nu hat (MLE)	31.14	nu star (bias corrected)	29.36
MLE Mean (bias corrected)	1.7278E-5	MLE Sd (bias corrected)	2.4698E-5
		Approximate Chi Square Value (0.05)	17.99
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	17.48
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	2.8196E-5	95% Adjusted Gamma UCL (use when n<50)	2.9025E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0944	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.159	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-16.3	Mean of logged Data	-12.18
Maximum of Logged Data	-9.085	SD of logged Data	1.898
Assuming Lognormal Distribution			
95% H-UCL	1.1739E-4	90% Chebyshev (MVUE) UCL	6.3882E-5
95% Chebyshev (MVUE) UCL	8.0678E-5	97.5% Chebyshev (MVUE) UCL	1.0399E-4
99% Chebyshev (MVUE) UCL	1.4978E-4		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			

95% CLT UCL	2.5265E-5	95% Jackknife UCL	2.5529E-5
95% Standard Bootstrap UCL	2.5098E-5	95% Bootstrap-t UCL	2.9021E-5
95% Hall's Bootstrap UCL	3.0175E-5	95% Percentile Bootstrap UCL	2.5552E-5
95% BCA Bootstrap UCL	2.7759E-5		
90% Chebyshev(Mean, Sd) UCL	3.1846E-5	95% Chebyshev(Mean, Sd) UCL	3.8445E-5
97.5% Chebyshev(Mean, Sd) UCL	4.7603E-5	99% Chebyshev(Mean, Sd) UCL	6.5594E-5
Suggested UCL to Use			
95% Adjusted Gamma UCL	2.9025E-5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | aroclor 1254 | 148)			
General Statistics			
Total Number of Observations	61	Number of Distinct Observations	36
Number of Detects	7	Number of Non-Detects	54
Number of Distinct Detects	7	Number of Distinct Non-Detects	29
Minimum Detect	0.0061	Minimum Non-Detect	0.035
Maximum Detect	0.551	Maximum Non-Detect	0.333
Variance Detects	0.0494	Percent Non-Detects	88.52%
Mean Detects	0.152	SD Detects	0.222
Median Detects	0.032	CV Detects	1.463
Skewness Detects	1.4	Kurtosis Detects	0.309
Mean of Logged Detects	-3.033	SD of Logged Detects	1.69
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.706	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.386	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	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			
KM Mean	0.0343	KM Standard Error of Mean	0.0123
KM SD	0.0822	95% KM (BCA) UCL	0.0567
95% KM (t) UCL	0.055	95% KM (Percentile Bootstrap) UCL	0.0566
95% KM (z) UCL	0.0547	95% KM Bootstrap t UCL	0.0759
90% KM Chebyshev UCL	0.0714	95% KM Chebyshev UCL	0.0882
97.5% KM Chebyshev UCL	0.111	99% KM Chebyshev UCL	0.157
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.596	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.288	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.326	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)	0.546	k star (bias corrected MLE)	0.407
Theta hat (MLE)	0.278	Theta star (bias corrected MLE)	0.373
nu hat (MLE)	7.641	nu star (bias corrected)	5.7
Mean (detects)	0.152		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0061	Mean	0.0338
Maximum	0.551	Median	0.01
SD	0.0838	CV	2.478
k hat (MLE)	0.83	k star (bias corrected MLE)	0.8
Theta hat (MLE)	0.0408	Theta star (bias corrected MLE)	0.0423
nu hat (MLE)	101.3	nu star (bias corrected)	97.63
Adjusted Level of Significance (β)	0.0461		
Approximate Chi Square Value (97.63, α)	75.84	Adjusted Chi Square Value (97.63, β)	75.38
95% Gamma Approximate UCL (use when n>=50)	0.0436	95% Gamma Adjusted UCL (use when n<50)	0.0438
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0343	SD (KM)	0.0822
Variance (KM)	0.00676	SE of Mean (KM)	0.0123
k hat (KM)	0.174	k star (KM)	0.177
nu hat (KM)	21.29	nu star (KM)	21.57
theta hat (KM)	0.197	theta star (KM)	0.194
80% gamma percentile (KM)	0.0421	90% gamma percentile (KM)	0.103
95% gamma percentile (KM)	0.182	99% gamma percentile (KM)	0.405
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (21.57, α)	12.02	Adjusted Chi Square Value (21.57, β)	11.85
95% Gamma Approximate KM-UCL (use when n>=50)	0.0617	95% Gamma Adjusted KM-UCL (use when n<50)	0.0626
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	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	0.0339	Mean in Log Scale	-4.019
SD in Original Scale	0.0829	SD in Log Scale	0.844
95% t UCL (assumes normality of ROS data)	0.0516	95% Percentile Bootstrap UCL	0.0534
95% BCA Bootstrap UCL	0.0628	95% Bootstrap t UCL	0.146
95% H-UCL (Log ROS)	0.0323		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.02	KM Geo Mean	0.018
KM SD (logged)	0.88	95% Critical H Value (KM-Log)	2.159
KM Standard Error of Mean (logged)	0.323	95% H-UCL (KM -Log)	0.0338
KM SD (logged)	0.88	95% Critical H Value (KM-Log)	2.159
KM Standard Error of Mean (logged)	0.323		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.112	Mean in Log Scale	-2.604
SD in Original Scale	0.0911	SD in Log Scale	1.039
95% t UCL (Assumes normality)	0.131	95% H-Stat UCL	0.172
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 Approximate Gamma UCL	0.0617		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | aroclor 1260 | 149)			
General Statistics			
Total Number of Observations	61	Number of Distinct Observations	54
Number of Detects	37	Number of Non-Detects	24
Number of Distinct Detects	37	Number of Distinct Non-Detects	17
Minimum Detect	0.0069	Minimum Non-Detect	0.039
Maximum Detect	24	Maximum Non-Detect	0.352
Variance Detects	17.92	Percent Non-Detects	39.34%
Mean Detects	1.371	SD Detects	4.233
Median Detects	0.231	CV Detects	3.088
Skewness Detects	4.815	Kurtosis Detects	24.43
Mean of Logged Detects	-1.36	SD of Logged Detects	1.733
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.336	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.379	**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			
KM Mean	0.865	KM Standard Error of Mean	0.43
KM SD	3.312	95% KM (BCA) UCL	1.616
95% KM (t) UCL	1.584	95% KM (Percentile Bootstrap) UCL	1.669
95% KM (z) UCL	1.573	95% KM Bootstrap t UCL	5.398
90% KM Chebyshev UCL	2.155	95% KM Chebyshev UCL	2.74
97.5% KM Chebyshev UCL	3.551	99% KM Chebyshev UCL	5.144
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.71	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.836	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.214	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.155	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.394	k star (bias corrected MLE)	0.38
Theta hat (MLE)	3.481	Theta star (bias corrected MLE)	3.608
nu hat (MLE)	29.14	nu star (bias corrected)	28.11
Mean (detects)	1.371		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0069	Mean	0.835

Maximum	24	Median	0.071
SD	3.347	CV	4.006
k hat (MLE)	0.283	k star (bias corrected MLE)	0.28
Theta hat (MLE)	2.949	Theta star (bias corrected MLE)	2.98
nu hat (MLE)	34.56	nu star (bias corrected)	34.2
Adjusted Level of Significance (β)	0.0461		
Approximate Chi Square Value (34.20, α)	21.82	Adjusted Chi Square Value (34.20, β)	21.58
95% Gamma Approximate UCL (use when n>=50)	1.309	95% Gamma Adjusted UCL (use when n<50)	1.324
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.865	SD (KM)	3.312
Variance (KM)	10.97	SE of Mean (KM)	0.43
k hat (KM)	0.0683	k star (KM)	0.0759
nu hat (KM)	8.33	nu star (KM)	9.254
theta hat (KM)	12.68	theta star (KM)	11.41
80% gamma percentile (KM)	0.37	90% gamma percentile (KM)	1.981
95% gamma percentile (KM)	5.017	99% gamma percentile (KM)	15.72
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (9.25, α)	3.481	Adjusted Chi Square Value (9.25, β)	3.395
95% Gamma Approximate KM-UCL (use when n>=50)	2.301	95% Gamma Adjusted KM-UCL (use when n<50)	2.359
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0845	**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	0.857	Mean in Log Scale	-2
SD in Original Scale	3.341	SD in Log Scale	1.635
95% t UCL (assumes normality of ROS data)	1.571	95% Percentile Bootstrap UCL	1.667
95% BCA Bootstrap UCL	2.22	95% Bootstrap t UCL	5.76
95% H-UCL (Log ROS)	0.908		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.036	KM Geo Mean	0.13
KM SD (logged)	1.763	95% Critical H Value (KM-Log)	2.844
KM Standard Error of Mean (logged)	0.263	95% H-UCL (KM -Log)	1.179
KM SD (logged)	1.763	95% Critical H Value (KM-Log)	2.844
KM Standard Error of Mean (logged)	0.263		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.882	Mean in Log Scale	-1.703
SD in Original Scale	3.336	SD in Log Scale	1.488
95% t UCL (Assumes normality)	1.595	95% H-Stat UCL	0.893
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			
KM H-UCL	1.179		
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.			

Appendix D
Support Documentation for the Calculation of Exposure Point Concentrations (EPCs)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Conc (so | site-wide | total soil | include | dioxin teq mammal halfnd | 426)			
General Statistics			
Total Number of Observations	73	Number of Distinct Observations	73
		Number of Missing Observations	0
Minimum	2.9737E-7	Mean	8.1684E-6
Maximum	9.0042E-5	Median	2.6692E-6
SD	1.5080E-5	Std. Error of Mean	1.7649E-6
Coefficient of Variation	N/A	Skewness	3.999
Normal GOF Test			
Shapiro Wilk Test Statistic	0.519	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.104	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	1.1109E-5	95% Adjusted-CLT UCL (Chen-1995)	1.1954E-5
		95% Modified-t UCL (Johnson-1978)	1.1247E-5
Gamma GOF Test			
A-D Test Statistic	2.313	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.801	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.156	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.109	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.666	k star (bias corrected MLE)	0.648
Theta hat (MLE)	1.2264E-5	Theta star (bias corrected MLE)	1.2609E-5
nu hat (MLE)	97.24	nu star (bias corrected)	94.58
MLE Mean (bias corrected)	8.1684E-6	MLE Sd (bias corrected)	1.0149E-5
		Approximate Chi Square Value (0.05)	73.15
Adjusted Level of Significance	0.0467	Adjusted Chi Square Value	72.77
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.0561E-5	95% Adjusted Gamma UCL (use when n<50)	1.0616E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.213	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0681	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.104	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-15.03	Mean of logged Data	-12.63
Maximum of Logged Data	-9.315	SD of logged Data	1.329
Assuming Lognormal Distribution			
95% H-UCL	1.1892E-5	90% Chebyshev (MVUE) UCL	1.2453E-5
95% Chebyshev (MVUE) UCL	1.4585E-5	97.5% Chebyshev (MVUE) UCL	1.7544E-5

99% Chebyshev (MVUE) UCL	2.3358E-5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.1072E-5	95% Jackknife UCL	1.1109E-5
95% Standard Bootstrap UCL	1.1053E-5	95% Bootstrap-t UCL	1.3049E-5
95% Hall's Bootstrap UCL	2.3622E-5	95% Percentile Bootstrap UCL	1.1268E-5
95% BCA Bootstrap UCL	1.2040E-5		
90% Chebyshev(Mean, Sd) UCL	1.3463E-5	95% Chebyshev(Mean, Sd) UCL	1.5862E-5
97.5% Chebyshev(Mean, Sd) UCL	1.9190E-5	99% Chebyshev(Mean, Sd) UCL	2.5729E-5
Suggested UCL to Use			
95% H-UCL	1.1892E-5		
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.			
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.			
Conc (so | site-wide | total soil | include | pcbc teq mammal halfnd | 398)			
General Statistics			
Total Number of Observations	90	Number of Distinct Observations	90
Number of Detects	89	Number of Non-Detects	1
Number of Distinct Detects	89	Number of Distinct Non-Detects	1
Minimum Detect	4.0700E-8	Minimum Non-Detect	7.1000E-7
Maximum Detect	1.1331E-4	Maximum Non-Detect	7.1000E-7
Variance Detects	5.047E-10	Percent Non-Detects	1.111%
Mean Detects	1.2679E-5	SD Detects	2.2465E-5
Median Detects	2.7355E-6	CV Detects	N/A
Skewness Detects	2.611	Kurtosis Detects	6.893
Mean of Logged Detects	-13.04	SD of Logged Detects	2.262
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.614	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.287	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0941	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			
KM Mean	1.2540E-5	KM Standard Error of Mean	2.3589E-6
KM SD	2.2253E-5	95% KM (BCA) UCL	1.6538E-5
95% KM (t) UCL	1.6461E-5	95% KM (Percentile Bootstrap) UCL	1.6764E-5
95% KM (z) UCL	1.6421E-5	95% KM Bootstrap t UCL	1.7704E-5
90% KM Chebyshev UCL	1.9617E-5	95% KM Chebyshev UCL	2.2823E-5
97.5% KM Chebyshev UCL	2.7272E-5	99% KM Chebyshev UCL	3.6011E-5
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.489	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.849	Detected Data Not Gamma Distributed at 5% Significance Level	

K-S Test Statistic	0.103	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.102	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)	0.376	k star (bias corrected MLE)	0.371
Theta hat (MLE)	3.3693E-5	Theta star (bias corrected MLE)	3.4165E-5
nu hat (MLE)	66.98	nu star (bias corrected)	66.06
Mean (detects)	1.2679E-5		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	4.0700E-8	Mean	1.2365E-4
Maximum	0.01	Median	2.7849E-6
SD	0.00105	CV	8.516
k hat (MLE)	0.188	k star (bias corrected MLE)	0.189
Theta hat (MLE)	6.5735E-4	Theta star (bias corrected MLE)	6.5340E-4
nu hat (MLE)	33.86	nu star (bias corrected)	34.06
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (34.06, α)	21.72	Adjusted Chi Square Value (34.06, β)	21.55
95% Gamma Approximate UCL (use when n>=50)	1.9396E-4	95% Gamma Adjusted UCL (use when n<50)	1.9541E-4
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.2540E-5	SD (KM)	2.2253E-5
Variance (KM)	4.952E-10	SE of Mean (KM)	2.3589E-6
k hat (KM)	0.318	k star (KM)	0.314
nu hat (KM)	57.17	nu star (KM)	56.59
theta hat (KM)	3.9487E-5	theta star (KM)	3.9886E-5
80% gamma percentile (KM)	1.9444E-5	90% gamma percentile (KM)	3.6770E-5
95% gamma percentile (KM)	5.6502E-5	99% gamma percentile (KM)	1.0749E-4
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (56.59, α)	40.3	Adjusted Chi Square Value (56.59, β)	40.08
95% Gamma Approximate KM-UCL (use when n>=50)	1.7610E-5	95% Gamma Adjusted KM-UCL (use when n<50)	1.7708E-5
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.936	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	2.6712E-4	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0946	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0941	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	1.2541E-5	Mean in Log Scale	-13.07
SD in Original Scale	2.2377E-5	SD in Log Scale	2.262
95% t UCL (assumes normality of ROS data)	1.6462E-5	95% Percentile Bootstrap UCL	1.6538E-5
95% BCA Bootstrap UCL	1.7346E-5	95% Bootstrap t UCL	1.7507E-5
95% H-UCL (Log ROS)	6.6666E-5		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-13.07	KM Geo Mean	2.1022E-6
KM SD (logged)	2.257	95% Critical H Value (KM-Log)	3.718
KM Standard Error of Mean (logged)	0.239	95% H-UCL (KM -Log)	6.5308E-5
KM SD (logged)	2.257	95% Critical H Value (KM-Log)	3.718

KM Standard Error of Mean (logged)	0.239		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.2542E-5	Mean in Log Scale	-13.06
SD in Original Scale	2.2376E-5	SD in Log Scale	2.257
95% t UCL (Assumes normality)	1.6463E-5	95% H-Stat UCL	6.6035E-5
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	2.2823E-5		
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.			

APPENDIX E

Table E-1

Dermal Absorption Factors

Human Health Risk Assessment

Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Chemical of Potential Concern	Dermal Absorption Factor* (unitless)
1,2,4,5-Tetrachlorobenzene	0.1
Benzo(a)anthracene	0.13
Benzo(a)pyrene	0.13
Benzo(b)fluoranthene	0.13
Dibenz(a,h)anthracene	0.13
Indeno(1,2,3-cd)pyrene	0.13
Dieldrin	0.1
Aroclor 1254	0.14
Aroclor 1260	0.14
PCBC TEQ MAMMAL HALFND	0.03
DIOXIN TEQ MAMMAL HALFND	0.03
Aluminum	0.01
Antimony	0.01
Arsenic	0.03
Cadmium (Diet)	0.001
Chromium, Total	0.01
Cobalt	0.01
Iron	0.01
Manganese	0.01
Thallium	0.01

(1) PCBC indicates polychlorinated biphenyls congeners.

(2) TEQ indicates 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) Toxic Equivalency.

(3) HALFND indicates that non-detected values were adjusted by 0.5 within the TEQ.

* Exhibit 3-4, Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part E – Supplemental Guidance for Dermal Risk Assessment (EPA, 2004a) and

* Assessing Dermal Exposure from Soil, Region 3, Technical Guidance Manual, Risk Assessment available at https://www.epa.gov/risk/assessing-dermal-exposure-soil

APPENDIX F

Table F-1
Site-Specific Particulate Emission Factor from Generation of Dust from Soil from Unpaved Roads (Construction Scenario)
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Environmental Transport and Fate Models

Air Modeling for Generation of Dust from Soil
Construction Scenario

1) General Form for Calculating Construction Worker Dispersion Factor (Q/Csr) (USEPA, 2002)

$$Q/C_{sr} = A \times \exp[(\ln A_{site} - B)^2 / C]$$

Values	Parameters	Parameter Description
12.9351	A	Constant (default, see USEPA [2002] for constant derivation)
5.7383	B	Constant (default, see USEPA [2002] for constant derivation)
71.7711	C	Constant (default, see USEPA [2002] for constant derivation)
5	A_{site}	Areal extent of the site or contamination (acres)
16.40	Q/C_{sr}	Inverse of 1-h average air concentration along a straight road segment bisecting a 5-acre square site (g/m^2-s per kg/m^3)

2) Calculation of Site-Specific Dispersion Correction Factor (F_D) (USEPA, 2002)

$$F_D = 0.1852 + (5.3537 \times 1/t_c) + (-9.6318 \times 1/t_c^2)$$

Values	Parameters	Parameter Description
6000	t_c	Duration of construction (hr)
0.1861	F_D	Dispersion correction factor (unitless, see USEPA [2002] for factor derivation)

3) Derivation of the Particulate Emission Factor Construction Scenario (USEPA, 2002)

$$PEF_{sc} = Q/C_{sr} \times 1/F_D \times \frac{T \times A_R}{556 \times (W/3)^{0.4} \times [(365 \text{ days/year} - p)/365 \text{ days/year}] \times [\text{SUM (VKT)}]}$$

Values	Parameters	Parameter Description
calc, site specific	PEF_{sc}	Subchronic road particulate emission factor (m^3/kg)
site specific	Q/C_{sr}	Inverse of 1-h average air concentration along a straight road segment bisecting a 5-acre square site (g/m^2-s per kg/m^3)
0.1861	F_D	Dispersion correction factor (unitless)
21600000	T	Total time over which construction occurs (s)
867	A_R	Surface area of contaminated road segment (m^2), Equation: LR × WR × 0.092903 m^2/ft^2
467	L_R	Length of road segment (ft)
20	W_R	Width of road segment (ft)
4.7	W	Mean vehicle weight (tons)
140	p	Number of days with at least 0.01 inches of precipitation (days/year) (Exhibit 5-2; USEPA, 2002)
5.33E+02	SUM (VKT)	Sum of fleet vehicle kilometers traveled during the exposure duration (km)
T =	21600000	Assume 1-year construction project working (5 days/week x 50 weeks/year x 1 year)
A_R =	867	Assume standard road width of 6.09 m
W =	4.7	Assume 10 two-ton cars + 2 ten-ton trucks + 1 ten-ton backhoe + 1 ten-ton bulldozer + 1 ten-ton excavator
SUM (VKT) =	5.33E+02	Assume travel length of road once per day, for length of project, where: = No of fleet vehicles x length of road (km/day) x construction period (days)
PEF_{sc}	7.57E+06	Subchronic road particulate emission factor (m^3/kg)

Notes:
(1) Selected to represent calculated size of exposure area (5 acres).

References:
USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24. December 2002.

Table F-2
Site-Specific Volatilization Factor
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Environmental Transport and Fate Models

Dispersion Factor for Chronic Volatile Emissions (Q/C_{vol})
Non-Construction Scenario (Open Air)

$$Q/C_{vol} = A * \exp[(\ln A_{site} - B)^2 / C]$$

Values	Parameter	Parameter Description
9.9253	A	Constant for Huntington, West Virginia; Climate Zone 7 (see USEPA [2002] for constant derivation)
18.6636	B	Constant for Huntington, West Virginia; Climate Zone 7 (see USEPA [2002] for constant derivation)
211.8862	C	Constant for Huntington, West Virginia; Climate Zone 7 (see USEPA [2002] for constant derivation)
5	A_{site}	Areal extent of the site or contamination (acres)(1)
39.16	Q/C_{vol}	Inverse of mean concentration at center of 5-acre-square source (g/m^2-s per kg/m^3)

Dispersion Factor for Subchronic Volatile Emissions (Q/C_{sa})
Construction Scenario (Trench Air)

$$Q/C_{sa} = A * \exp[(\ln A_{site} - B)^2 / C]$$

Values	Parameter	Parameter Description
2.4538	A	Constant (default, see USEPA [2002] for constant derivation)
17.566	B	Constant (default, see USEPA [2002] for constant derivation)
189.0426	C	Constant (default, see USEPA [2002] for constant derivation)
5	A_{site}	Areal extent of the site or contamination (acres)(1)
9.44	Q/C_{sa}	Inverse of the ratio of the 1-h. geometric mean air concentration and the volatilization flux at the center of a square emission source (g/m^2-s per kg/m^3)

Notes:
(1) Selected to represent calculated size of exposure area (5 acres).

References:
USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24. December 2002.

Table F-3
Derivation of the Soil Saturation Concentrations
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Volatile Soil Chemical of Potential Concern	CASRN	Solubility Limit (mg/L)	K_{oc} (L/kg)	K_d (L/kg)	H' (unitless)	Csat (mg/kg)	Physical State at Average Soil Temp
Semi-volatile Organic Compounds (SVOCs)							
1,2,4,5-Tetrachlorobenzene	95-94-3	5.95E-01	2.22E+03	1.33E+01	4.09E-02	7.99E+00	Solid
Benzo(a)anthracene	56-55-3	9.40E-03	1.77E+05	1.06E+03	4.91E-04	9.98E+00	Solid
Polychlorinated Biphenyls (PCBs)							
Aroclor 1254	11097-69-1	4.30E-02	1.31E+05	7.83E+02	1.16E-02	3.37E+01	Solid
Aroclor 1260	11096-82-5	1.44E-02	3.50E+05	2.10E+03	1.37E-02	3.02E+01	Solid
Polychlorinated Biphenyls (PCBs) - Congeners							
PCBC TEQ MAMMAL HALFND	PCB_TEQ_MAMMAL	2.00E-04	2.49E+05	1.49E+03	2.04E-03	2.99E-01	Solid
Dioxins and Furans							
DIOXIN TEQ MAMMAL HALFND	DF_TEQ_MAMMAL	2.00E-04	2.49E+05	1.49E+03	2.04E-03	2.99E-01	Solid

Notes:
(1) Non-calculated parameters were selected from USEPA (2021) - Regional Screening Levels Table, November 2021.
CASRN = Chemical Abstracts Service Registry Number
PCBC TEQ MAMMAL and DIOXIN TEQ MAMMAL are represented by 2,3,7,8-TCDD.

Derivation of the Soil Saturation (C_{sat})[a]

$$C_{sat} = \frac{S}{\rho_b} \times (K_d \rho_b + \theta_w + H' \theta_a)$$

Equation Parameter/Definitions (units)	Value	Notes
C_{sat} /soil saturation concentration (mg/kg)	Calculated	Calculated
S /solubility in water (mg/L – water)	See above	Constituent-specific
ρ_b /dry soil bulk density (kg/L)	1.5	Default
K_d /soil-water partition coefficient (L/kg)	See above	Organics: $K_d = K_{oc} \times f_{oc}$
		Inorganics: Constituent-specific[b]
Koc /soil organic carbon partition coefficient (L/kg)	See above	Constituent-specific
F_{oc} /fraction organic carbon in soil (g/g)	0.006	Default
θ_w /water-filled soil porosity (L_{water}/L_{soil})	0.15	Default
H' /dimensionless Henry's law constant	See above	Constituent-specific
θ_a /air-filled soil porosity (L_{air}/L_{soil})	0.28	0.28 or n-θ_w
n /total soil porosity (L_{pore}/L_{soil})	0.43	$1 - (\rho_b/\rho_s)$
ρ_s /soil particle density (g/cm^3)	2.65	Default

[a] USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24. December 2002.
[b] Assumed a pH of 6.8 when selecting K_d values for metals.

Table F-4
Henry's Law Constant at System Temperature
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Soil Volatile Chemical of Potential Concern	CASRN	T_C (°K)	T_B (°K)	T_B/T_C	n	$\Delta H_{v,b}$ (cal/mol)	$\Delta H_{v,TS}$ (cal/mol)	H_R (atm-m^3/mol)	T_R (°K)	H'_{TS}	Parameter Source
Semi-volatile Organic Compounds (SVOCs)											
1,2,4,5-Tetrachlorobenzene	95-94-3	7.74E+02	5.16E+02	6.67E-01	3.77E-01	1.24E+04	1.58E+04	1.38E-03	2.98E+02	1.93E-02	NIST, 2017
Benzo(a)anthracene	56-55-3	1.00E+03	7.08E+02	7.05E-01	4.06E-01	1.60E+04	2.29E+04	3.34E-06	2.98E+02	2.81E-05	USEPA, 2001
Polychlorinated Biphenyls (PCBs)											
Aroclor 1254	11097-69-1	9.80E+02	6.53E+02	6.67E-01	0.377333333	13000	17273.20971	0.002	298.15	0.02508358	ATSDR, 2000 and USEPA, 2001
Aroclor 1260	11096-82-5	1.01E+03	6.73E+02	6.67E-01	0.377333333	13000	17352.80128	0.0046	298.15	0.057368139	ATSDR, 2000 and USEPA, 2001
Polychlorinated Biphenyls (PCBs) - Congeners											
PCBC TEQ MAMMAL HALFND	PCB_TEQ_MAMMAL	9.78E+02	6.52E+02	6.67E-01	0.377333333	21000	27897.34929	0.00005	298.15	0.000295631	USEPA, 2001 and 2012
Dioxins and Furans											
DIOXIN TEQ MAMMAL HALFND	DF_TEQ_MAMMAL	9.78E+02	6.52E+02	6.67E-01	3.77E-01	2.10E+04	2.79E+04	5.00E-05	2.98E+02	2.96E-04	USEPA, 2001 and 2012

Notes:

CASRN = Chemical Abstract Services Registry Number

PCBC TEQ MAMMAL and DIOXIN TEQ MAMMAL are represented by 2,3,7,8-TCDD.

$$H'_{TS} = \frac{\exp\left[-\frac{\Delta H_{v,TS}}{R_c}\left(\frac{1}{T_S}-\frac{1}{T_R}\right)\right] \times H_R}{RT_S}$$

Where:

$$\Delta H_{v,TS} = \Delta H_{v,b}\left[\frac{\left(1-{}^{T_S}/_{T_C}\right)}{\left(1-{}^{T_B}/_{T_C}\right)}\right]^n$$

Input Parameter	Variable	Values	Unit	Note
Henry's law constant at temperature	H'_{TS}	calculated	unitless	USEPA (2001)
Enthalpy of vaporization at the system temperature	$\Delta H_{v,TS}$	calculated	cal/mol	USEPA (2001)
System Temperature	T_S	286.15	°K	13°C, average shallow subsurface for West Virginia per Voluntary Remediation Program guidance
Henry's law constant reference temperature	T_R	chemical-specific	°K	See Parameter Source
Henry's law constant at the reference temperature	H_R	chemical-specific	atm-m^3/mol	See Parameter Source
Gas constant	R_C	1.9872	cal/mol°K	USEPA (2001)
Gas constant	R	8.2E-05	atm-m^3/mol°K	USEPA (2001)
Enthaply of vaporization at the normal boiling point	$\Delta H_{v,b}$	chemical-specific	cal/mol	See Parameter Source
Critical temperature	T_C	chemical-specific	°K	See Parameter Source
Boiling temperature	T_B	chemical-specific	°K	See Parameter Source
Constant	n	see below	unitless	USEPA (2001)

IF Tb/Tc:	n equals:
<0.57	0.3
0.57 - 0.71	0.74(Tb/Tc) - 0.116
>0.71	0.41

References:

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for Polychlorinated Biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

National Institute of Standards and Technology (NIST). 2017. NIST Standard Reference Database 69: NIST Chemistry WebBook. U.S. Department of Commerce. https://webbook.nist.gov/chemistry/

United States Environmental Protection Agency (USEPA). 2001. Fact Sheet: Correcting the Henry's Law Constant for Soil Temperature. June 2001. https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/doc/factsheet.pdf

USEPA. 2012. Estimation Programs Interface Suite™ for Microsoft® Windows, v 4.11. United States Environmental Protection Agency, Washington, DC, USA.

Table F-5
Calculation of Receptor-Specific Volatilization Factors for the Soil-to-Outdoor Air Exposure Pathway
Human Health Risk Assessment
Shaffer Equipment/Arbuckle Creek Area Superfund Site, Minden, West Virginia

Soil Volatile Chemical of Potential Concern	CASRN	From USEPA (2021)			Calculated						
		K_{oc} (cm^3/g)	D_{ia} (cm^2/s)	D_{iw} (cm^2/s)	H'_{TS} (unitless)	K_d (cm^3/g)	D_A (cm^2/s)	VF_r (m^3/kg)	VF_{ind} (m^3/kg)	VF_{tp} (m^3/kg)	VF_{sc} (m^3/kg)
Semi-volatile Organic Compounds (SVOCs)											
1,2,4,5-Tetrachlorobenzene	95-94-3	2.22E+03	3.19E-02	8.75E-06	1.93E-02	1.33E+01	2.45E-06	4.24E+04	4.15E+04	2.63E+04	1.08E+04
Benzo(a)anthracene	56-55-3	1.77E+05	2.61E-02	6.75E-06	2.81E-05	1.06E+03	7.72E-11	7.54E+06	7.39E+06	4.67E+06	1.93E+06
Polychlorinated Biphenyls (PCBs)											
Aroclor 1254	11097-69-1	1.31E+05	2.37E-02	6.10E-06	2.51E-02	7.83E+02	4.05E-08	3.29E+05	3.23E+05	2.04E+05	8.40E+04
Aroclor 1260	11096-82-5	3.50E+05	2.20E-02	5.61E-06	5.74E-02	2.10E+03	3.21E-08	3.70E+05	3.63E+05	2.29E+05	9.44E+04
Polychlorinated Biphenyls (PCBs) - Congeners											
PCBC TEQ MAMMAL HALFND	PCB_TEQ_MAMMAL	2.49E+05	4.70E-02	6.76E-06	2.96E-04	1.49E+03	5.24E-10	2.89E+06	2.84E+06	1.79E+06	7.39E+05
Dioxins and Furans											
DIOXIN TEQ MAMMAL HALFND	DF_TEQ_MAMMAL	2.49E+05	4.70E-02	6.76E-06	2.96E-04	1.49E+03	5.24E-10	2.89E+06	2.84E+06	1.79E+06	7.39E+05

Notes:

CASRN = Chemical Abstract Services Registry Number

$$VF_i\ (m^3/kg) = \frac{(Q/C_{vol}) \times (3.14 \times D_A \times T)^{0.5} \times 10^{-4}\ (m^2/cm^2)}{(2 \times P_b \times D_A)} \quad \text{(USEPA, 2002)}$$

$$VF_{sc}\ (m^3/kg) = \frac{(Q/C_{sa}) \times (3.14 \times D_A \times T)^{0.5} \times 10^{-4}\ (m^2/cm^2)}{(2 \times P_b \times D_A) \times F_d} \quad \text{(USEPA, 2002)}$$

$$D_A\ (cm^2/s) = \frac{[(\theta_a^{10/3} \times D_{ia} \times H'_{TS} + \theta_w^{10/3} \times D_{iw})/n^2]}{P_b \times K_d + \theta_w + \theta_a \times H'_{TS}} \quad \text{(USEPA, 2002)}$$

Values	Parameter		Parameter Definition
calc	VF_i		Volatilization factor, *receptor exposure* (m^3/kg)
receptor-specific	i		Used with VF variable to denote *r* (residential/recreational), *ind* (industrial), *tp* (trespasser), and *sc* (subchronic)
calc	VF_{sc}		Volatilization factor, subchronic (m^3/kg)
39.16	Q/C_{vol}	$= Q/C_{wind}$	Inverse of mean concentration at center of 5-acre-square source (g/m^2-s per kg/m^3) (chronic)
9.44	Q/C_{vol}	$= Q/C_{sa}$	Inverse of the ratio of the 1-h. geometric mean air concentration and the volatilization flux at the center of square emission source (g/m^2-s per kg/m^3) (subchronic)
calc	D_A		Apparent diffusivity (cm^2/s)
8.2E+08	T_r		Exposure interval (s); residential/recreational exposure of 26 years (chronic)
7.9E+08	T_{ind}		Exposure interval (s); industrial exposure of 25 years (chronic)
3.2E+08	T_{tp}		Exposure interval (s); trespasser exposure of 10 years (chronic)
3.2E+07	T_{sc}		Exposure interval (s); construction project duration of 1 year (subchronic)
0.185	F_d		Dispersion correction factor (unitless)
1.5	P_b		Dry soil bulk density (g/cm^3)
0.28	θ_a	$n - \theta_w$	Air filled soil porosity (L_{air}/L_{soil})
0.43	n	$1 - (P_b / P_s)$	Total soil porosity (L_{pore}/L_{soil})
0.15	θ_w		Water-filled soil porosity (L_{water}/L_{soil})
2.65	P_s		Soil particle density (g/cm^3)
chem-specific	D_{ia}		Diffusivity in air (cm^2/s)
calculated	H'_{TS}		Henry's Law constant at system temperature, dimensionless (unitless) - See Table F-5
chem-specific	D_{iw}		Diffusivity in water (cm^2/s)
K_{oc}*F_{oc}	K_d		Soil-water partition coefficient (cm^3/g) =Koc*foc
chem-specific	K_{oc}		Soil organic carbon-water partition coefficient (cm^3/g)
0.006	F_{oc}		fraction organic carbon in soil (g/g)

References:

United States Environmental Protection Agency (USEPA). 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December 2002.
USEPA. 2021. Regional Screening Level (RSL) Table and User's Guide, Dated November 2021. https://www.epa.gov/risk/regional-screening-levels-rsls