Supplemental Feasibility Study, Eighteen Mile Creek Superfund Site, OU 1, Niagara County, New York

I. Introduction

This document evaluates the remedial action alternatives considered by New York State Department of Environmental Protection (NYSDEC) for residential properties in its March 2010 Record of Decision (2010 ROD) and the 2006 ROD for the former Flintkote Plant building at the Eighteen Mile Creek Superfund Site (Site) and develops remedial alternatives for evaluation for a discrete portion of the Site, referred to as Operable Unit 1 (OU1). This Site, located in Niagara County, New York, includes contaminated sediments, soil, and groundwater in and around Eighteen Mile Creek (Creek). OU1 concerns soil contamination at several residential properties in the area of Water Street in Lockport, New York and evaluates of the condition of an industrial building at the former Flintkote Company Plant (former Flintkote Plant), located at 300 Mill Street, in Lockport, New York.

In 2011, NYSDEC requested that EPA consider the Site for inclusion on its National Priorities List (NPL). In March 2012, EPA included the Site on the NPL and, since that time, EPA has analyzed the data collected by NYSDEC and conducted its own studies, which are the basis for this Supplemental FS.

II. Site Background

The headwaters of the Creek consist of an East and West Branch which begin immediately north of the New York State Barge Canal. Water from the Creek's East Branch originates at the spillway on the south side of the Canal, where it is directed northward underneath the Canal and the Mill Street Bridge through a culvert. Water from the West Branch originates from the dry dock on the north side of the Barge Canal and then flows northward. The East and West Branches converge just south of Clinton Street in Lockport. The Creek flows north for approximately 15 miles and discharges to Lake Ontario in Olcott, New York. A Site location map is provided as Figure 1.

In Lockport, the area known as the Creek Corridor is bordered by residential properties along Water Street (Residential Properties) and vacant land to the west, Upson Park to the south, Mill Street to the east, and the former Flintkote Plant property to the north. The topography of the area is relatively flat other than a steep downward slope toward the Creek and the millrace, which bisects the former Flintkote Plant property. The stretch of the Creek along what is referred to as the Creek Corridor is approximately 4,000 feet in length.

The Residential Properties which, along with the remaining building at the former Flintkote Plant are the subject of OU 1, encompass an area of approximately 2.25 acres. The Properties are adjacent to the Creek and experience flooding during high water events. Severe flooding of up to 100 feet from the Creek bank occurs approximately once every two years, with lesser flooding occurring several times a year as a result of heavy precipitation and blockage of culverts through which the Creek flows under William Street.

The former Flintkote Plant property occupies approximately six acres and includes parcels 300, 225, and 198 Mill Street. These parcels are located east and northeast of the Water Street properties. Previous investigations indicated that the subsurface soils beneath the former Flintkote Plant building at 300 Mill Street may be a potential source of contamination to the

Creek. Because of the dilapidated state of the building, EPA and NYSDEC have been unable to safely sample these subsurface soils. Therefore, demolition of the building has been included as a component of EPA's remedial selection process for OU 1 so that EPA can gain access to sample the subsurface soils and to determine the nature and extent of contamination under the building.

III. Remedial Alternatives Evaluated by NYSDEC

In March 2006, the NYSDEC issued a ROD to address the contamination at the former Flintkote Plant property. NYSDEC's 2010 ROD addressed certain areas of contamination in the Creek Corridor, which included the Residential Properties and several other commercial/industrial properties. The remedies NYSDEC selected in these RODs have not been implemented.

The 2010 ROD addressed the contamination in the Creek and the other properties in the Corridor as six operable units: OU1 called for sediment and bank excavation for the Corridor's Creek segment; OU3 specified excavation of contaminated soil from the former United Paperboard Property; OU4 called for excavation of contaminated soil from the Upson Park; and OU5 called for installation of a soil cap over contaminated soil at the White Transportation property. OU6 required excavation of contaminated soil at the residential properties on Water Street.

Section IV.A of this Supplemental Study (SFS) evaluates and modifies the NYSDEC's selected remedy for, OU6, the residential properties. The rest of the Creek Corridor will be addressed by EPA under a future operable unit.

In NYSDEC's 2010 ROD, NYSDEC evaluated five different remedial alternatives for the remediation of the Residential Properties. The alternatives, which follow, are numbered to correspond with the state ROD. The ROD's Alternative 3 was not considered by EPA for this operable unit since it addressed contamination at other commercial/industrial properties in the Corridor, but not the Residential Properties.

- Alternative 1 – No Action
- Alternative 2 - Institutional Controls and Long-term Monitoring (LTM)
- Alternative 4 - Limited Excavation with Bank Stabilization and LTM
- Alternative 5 - Complete Containment with LTM
- Alternative 6 - Complete Excavation

Alternative 2 called for the use of institutional controls to prevent exposure to soil which exceeds the NYSDEC's soil clean up objectives for residential properties. Alternative 4 specified excavation of on-site soils exceeding the NYSDEC's residential soil clean up objectives. Alternative 5 specified complete containment of contaminated soil (a soil cap) that exceeds the NYSDEC's unrestricted, residential soil clean up objectives. And, Alternative 6 required complete excavation of on-site soils exceeding the NYSDEC's unrestricted, residential use soil clean up objectives. Alternatives 2, 4 and 5 specified residential soil clean up objectives of 400 ppm for lead and 1 ppm for PCBs. Alternative 6 specified unrestricted, residential soil clean up objectives of 63 ppm for lead and 0.1 ppm for PCBs.

Operable Unit 2 was established by the NYSDEC's 2006 ROD which addressed the cleanup of the former Flintkote Plant property parcels at 198 and 300 Mill Street and the old, deteriorated building at 300 Mill Street. The 2006 ROD evaluated two alternatives for the building: partial demolition to remove asbestos containing material and full demolition to four feet below grade level. Section IV. B. of this SFS evaluates and modifies the NYSDEC's alternatives for the building.

A. **EPA's Remedial Action Objectives**

EPA completed a quantitative Risk Assessment for OU1 on July 23, 2013, (included as Attachment A), and found that the soil at certain residential properties on Water Street poses an unacceptable risk to human health. The National Contingency Plan established an acceptable risk range of cancer of 10^{-4} (one in ten thousand) to 10^{-6} (one in a million) as the basis for decisions regarding carcinogens. The HHRA identified four properties where the cancer risks exceeded the risk range. At these properties, the cancer risk ranged from 7×10^{-4} (seven in ten thousand) to 1×10^{-3} (one in a thousand) and was driven primarily by chromium. Four additional properties were within the upper bounds of the acceptable risk range and one property had risk within the acceptable risk range.

Consistent with EPA policy and guidance, the HHRA evaluated lead through the use of a model to predict lead exposure in children six years and younger who are a particularly sensitive population. HHRA concluded that the average soil concentrations at five of the nine properties are above EPA's health-based screening level of 400 ppm for lead based on model results. The average lead concentration at each of the five properties ranged from 741 ppm to 1,088 ppm. EPA has also established a risk based screening level of 1 ppm for PCBs and 400 ppm of lead.

The following remedial action objectives (RAOs) for contaminated soil will address the human health risk concerns at the Residential Properties:

- Reduce or eliminate exposure (via ingestion and dermal contact) to PCBs and metals in soils at concentrations in excess of the preliminary remediation goals (PRGs). The PRG for PCBs and lead is 1 ppm and 400 ppm, respectively;

- Reduce or eliminate the potential for migration of contaminants from the Residential Properties to the Creek.

The following RAOs for the building at the former Flintkote Plant property will address unacceptable conditions:

- Prevent exposure to building materials contaminated with COPCs;

- Eliminate hazards to future Site workers posed by unstable structures; and

- Remove structural impediments that might interfere with subsurface sampling.

IV. **Supplemental FS Remedial Alternatives**

The remedial alternatives identified by EPA for OU1 differ from the remedial alternatives in NYSDEC's 2010 ROD. First, EPA's proposed alternatives did not consider bank stabilization because such measures were determined not to be necessary for OU1, as remediation of the Residential Properties would be delayed until the contaminated Creek sediments and the other properties in the Corridor are addressed in a future operable unit. Second, EPA's proposed alternatives consider relocation of residents in its alternatives while NYSDEC did not. And finally, pursuant to 40 CFR § 300.430, EPA does not generally evaluate institutional controls as a stand-alone alternative or as a substitute for active response actions such as a clean soil cover (capping) or excavation. However, institutional controls and long-term monitoring are included as a supplement to the soil capping alternative described below in order to achieve the RAOs.

None of the alternatives described below address the soil contamination which exists at other commercial/properties within the Creek Corridor or in the Creek itself. These properties and the Creek will be addressed by future operable units.

Below, are the remedial alternatives considered by EPA for Operable Unit 1.

A. Soil Alternatives

1. No Action

The No Action alternative involves taking no further action to remedy the condition of contaminated soils. The NCP requires that the No Action alternative be retained and used as basis of comparison to other potential remedial alternatives for the analysis of alternatives.

2. Active Alternatives which include Construction

Because the Residential Properties are subject to periodic flooding from the Creek, remediation of the Residential Properties prior to the remediation of the contaminated sediments in the Creek would probably result in the recontamination of the Residential Properties. For all of the active alternatives, construction activities on the Residential Properties would commence after or concurrent with the implementation of the remedy for the Creek sediments.

Acquisition and relocation activities associated with Alternatives 2b and 3b would commence upon issuance of the ROD and the actual demolition of the residential homes would be conducted after the residents have been relocated. Demolition of the homes have been included as remedial components since it is not know whether the residential home could with stand the potential stresses posed by remedy implementation. Construction methods such as lifting, moving or securing the homes, may be technically unfeasible or cost-prohibitive.

2a. Capping; Engineering and Institutional Controls

This alternative consists of containment of contaminated soil (a soil cap) which exceeds the PRGs for lead and PCBs. Institutional controls would also be required to maintain the cap and to prevent any excavation of the underlying soils unless provided using an approved site management plan.

2b. Capping; Engineering and Institutional Controls; and Permanent Relocation

This alternative also consists of containment of contaminated soil (a soil cap) that exceed the PRGs for lead and PCBs. Institutional controls would be required to maintain the cap and to prevent any excavation of the underlying soils unless provided using an approved site management plan. In addition, this alternative calls for the residential properties on Water Street to be acquired, occupants of the Residential Properties to be relocated, and the structures to be demolished.

3a. Soil Excavation; Off-Site Disposal with Treatment

This alternative includes excavation of an estimated 5,800 cubic yards of contaminated soil and fill at the residential properties and off-Site disposal at a Resource Conservation and Recovery

Act (RCRA) or Toxic Substances Control Act (TSCA) regulated landfill, as appropriate, based on the concentrations of contaminants in the excavated soil and fill. Verification samples would be collected following excavation to confirm that all contaminated soil and fill in excess of the PRGs has been removed. Once excavation activities have been completed, clean soil will be used as backfill, with the top six inches consisting of topsoil that would be planted with native grasses, shrubs, and/or trees. Clean backfill would meet the requirements for soil covers and backfill as set forth in 6 NYCRR Section. 375.

3b. Soil Excavation; Off-Site Disposal with Treatment; and Permanent Relocation

This alternative includes excavation of an estimated 5,800 cubic yards of contaminated soil and fill at the Residential Properties and off-Site disposal at a Resource Conservation and Recovery Act (RCRA) or Toxic Substances Control Act (TSCA) regulated landfill, as appropriate, based on the concentrations of contaminants in the excavated soil and fill. Verification samples would be collected following excavation to confirm that all contaminated soil and fill in excess of the PRG has been removed. Once excavation activities have been completed, clean soil will be used as backfill, with the top six inches consisting of topsoil that would be planted with native grasses, shrubs, and/or trees. Clean backfill would meet the requirements for soil covers and backfill as set forth in 6 NYCRR Section. 375. This alternative also calls for the residential properties on Water Street to be acquired, occupants of the Residential Properties to be relocated, and the structures to be demolished.

B. Building Alternatives

A separate stand-alone remedial alternative for demolition of the former Flintkote Building at 300 Mill Street was not included in NYSDEC's 2006 ROD for the former Flintkote property. As noted above, the ROD evaluated two alternatives for the building: partial demolition to remove asbestos containing material and full demolition to four feet below grade level. Full demolition of the building is necessary in order to fully characterize the subsurface under the building. Partial demolition would not allow for full characterization of the surface and therefore was not considered as a potential alternative by EPA.

Regarding any historic or cultural resource value the building may have, the New York State Historic Preservation Office (SHPO) determined that the building, it its present condition, has no historic or cultural value. The SHPO's determination is included as Attachment B.

1 No Action

The No Action Alternative involves taking no further action to remedy the condition of contaminated soils. The NCP requires that the No Action Alternative be retained and be used as basis of comparison to other the remedial alternatives retained for the analysis of alternatives.

2 Demolition of the former Flintkote Building at 300 Mill Street, Lockport, NY

Previous investigations indicated that the subsurface soils beneath the former Flintkote Plant may be a potential source of contamination to the Eighteen Mile Creek. Because of the dilapidated state of the building on this property, EPA and NYSDEC have been unable to safely sample these subsurface soils. As such, the demolition of the building is necessary to gain access to sample the subsurface soils. In addition, sampling indicates that the building is contaminated with asbestos-containing material, polynuclear aromatic hydrocarbons (PAHs), pesticides and metals, and thus poses a threat of release of hazardous substances into the environment. The results of the building samples are provided in Attachment C.

V. Supplemental Information on Remedial Alternative Costs

This Supplemental FS also documents certain cost items used to derive cost estimates for remedial alternatives 2a to 3b for the Operable Unit 1. These items are as follows:

- Detailed costs for purchasing nine residential properties and relocation of residents from houses on five of the properties on Water Street. Attachment D documents the estimated costs.
- Cost for demolishing the former Flintkote Building at 300 Mill Street in Lockport, NY. Attachment E documents the estimated costs.
- Estimated costs of the potential remedial alternatives for the proposed plan are provided in Attachment F.

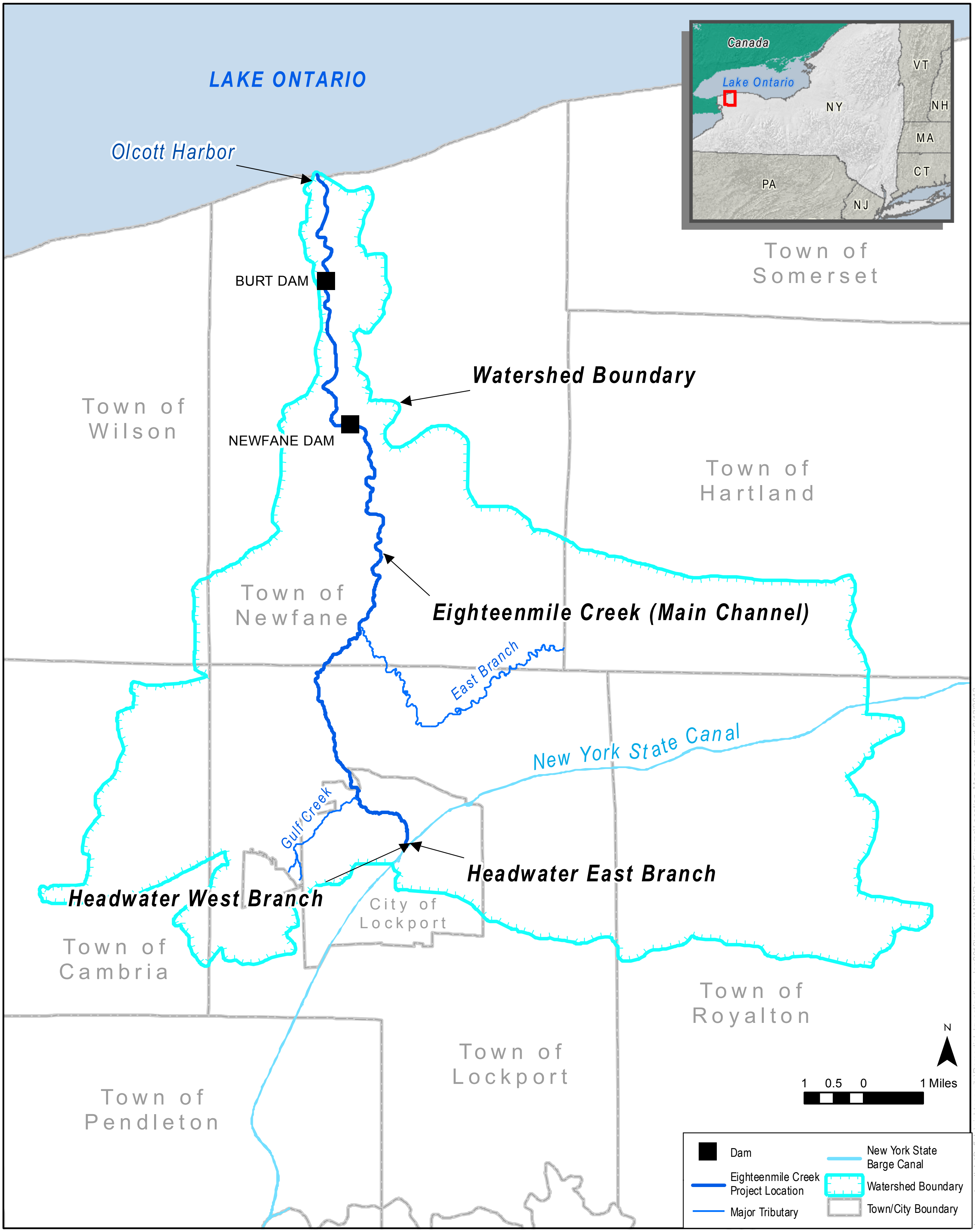

Figure 1 Eighteen Mile Creek Site Location

R2-0014275

Eighteen Mile Creek Superfund Site
Human Health Risk Assessment
EPA ID#: NYN000206456
Niagara County, New York

U. S. Environmental Protection Agency
Region 2 – Emergency and Remedial Response Division
290 Broadway
New York, New York 10007

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The Risk Assessment Guidance for Superfund (RAGS) Part D Tables are provided for the individual properties. The Introductory Section provides a list of acronyms used in the RAGS Part D Tables. A complete set of RAGS Part D Tables are provided for each individual property. The Tables are identified below.

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Cancer Risks and Non-cancer Hazards for Child (for chemicals with a Mutagenic Mode of Action)
Cancer Risk and Non-cancer Hazards for Adults

Table 10. Separate Tables are developed for RME and CTE Individuals

Cancer Risks and Non-cancer Hazards for Child
Cancer Risks and Non-cancer Hazards for Child (for chemicals with a Mutagenic Mode of Action)
Cancer Risk and Non-cancer Hazards for Adults

List of Acronyms and Abbreviations.	
95UCL	95% Upper Confidence Limit
ABSd	Dermal Absorption Fraction
ADAF	Age Dependent Adjustment Factor
AT	Averaging Time
ATSDR	Agency for Toxic Substances and Disease Registry of the Centers for Disease Control and Prevention
BPb	Blood lead level in blood
BW	Bodyweight
CalEPA	California Environmental Protection Agency
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CF	Conversion Factor
COPC	Chemical(s) of Potential Concern
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CTE	Central Tendency Exposure
DAD	Dermally Absorbed Dose
DAevent	Absorbed Dose Per Event
DAF	Dermal Adherence Factor
CDI	Chronic Daily Intake
EA	Exposure Area
ED	Exposure Duration
EF	Exposure Frequency
EPC	Exposure Point Concentration
g/mole	Grams/mole
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
I	Intake
IEUBK	Integrated Exposure, Uptake and Biokinetic Model (for lead)
IR	Intake Rate
IRIS	Integrated Risk Information System
Kp	Dermal permeability coefficient
LOAEL	Lowest Observed Adverse Effect Level
mg/kg	milligrams/kilogram
mg/kg-day	Milligrams/kilogram-day
mg/m3	Milligrams/cubic meter
MMOA	Mutagenic Mode of Action
MRLs	Minimal Risk Levels
NCP	National Oil and Hazardous Substances Contingency Plan
NOAEL	No Observed Adverse Effect Level
NRC	National Research Council of the National Academies of Sciences

List of Acronyms and Abbreviations	
NYSDEC	New York State Department of Environmental Conservation
OSWER	Office of Solid Waste and Emergency Response
PAH	Polynuclear Aromatic Hydrocarbons
Pb	lead
PCB	Polychlorinated biphenyl
ppm	Parts per million or mg/kg.
PPRTV	Provisional Peer Reviewed Toxicity Values
PRGs	Preliminary Remediation Goals
QA	Quality Assurance
QC	Quality Control
RAGS	Risk Assessment Guidance for Superfund
RBA	Relative Bioavailability
RfC	Reference Concentration (inhalation)
RfD	Reference Dose (oral)
RI/FS	Remedial Investigation / Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RSL	Regional Screening Level
SA	Surface Area
SB	Soil Boring
SS	Surface soil
ug/dl	micrograms/deciliter
ug/m^3	Micrograms/cubic meter
UFs	Uncertainty Factors
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WOE	Weight of Evidence for Carcinogenicity A – Known Human Carcinogen B - Probable Human Carcinogen C – Possible Human Carcinogen D – Not classifiable as to Carcinogenicity E – Not known to cause cancer in humans

Executive Summary

This document presents the baseline Human Health Risk Assessment (HHRA) for chemicals found on residential properties at the Eighteen Mile Creek Superfund Site (the Site). The Site is located in the City of Lockport in the Town of Lockport in Niagara County, New York (USEPA ID Number: NYN000206456). This HHRA evaluated potential exposures to chemicals found in the soils of nine residentially zoned properties at the Site. The HHRA is part of the Site Remedial Investigation/Feasibility Study (RI/FS) and supports remedial decisions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The HHRA quantitatively evaluates cancer risks and non-cancer health hazards from exposure to chemical contaminants in soil under the assumption of a residential land use. The HHRA relied on an investigation of these properties performed by the New York State Department of Environmental Conservation (NYSDEC) in 2002 and 2005 (NYSDEC, 2006). The main Chemicals of Potential Concern (COPC) identified on the properties included: metals, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs). The HHRA evaluated current and future risks to residents including children and adults under baseline conditions, which means in the absence of any remedial action and/or institutional controls to prevent exposure.

The HHRA followed appropriate guidelines, guidance, policies and more specifically the Risk Assessment Guidance for Superfund (RAGS) developed by the U. S. Environmental Protection Agency (USEPA). The HHRA evaluated risks to the Reasonably Maximally Exposed (RME) individual. The RME individual is defined as “the highest exposure that might reasonably be expected to occur” (USEPA, 1989) and is well above the average case of exposure but within the range of possibility.

The HHRA process consists of the following four steps:

- **Data collection and evaluation**, to determine the nature and extent of chemical contamination in environmental media, such as soil;

- **Exposure assessment**, to determine the potential for exposure and an estimation of human chemical intake through exposure routes, such as ingestion, inhalation of fugitive dust and skin contact;

- **Toxicity assessment**, to determine cancer and non-cancer health effects from exposure to chemicals; and

- **Risk characterization**, to quantify the likelihood and degree of chemical exposures at the Site and the possible adverse health effects associated with such exposures and associated uncertainties.

Data Collection and Evaluation

Data was obtained from sampling conducted by the NYSDEC in 2002 and 2005 and used by NYSDEC to support a Record of Decision (ROD) for the properties (NYSDEC, 2006). The data was evaluated by USEPA and determined to be appropriate for use in the HHRA. This step also involved the selection of COPCs. The main COPCs that are evaluated in the HHRA are PCBs, lead, and PAHs.

Exposure Assessment

Consistent with the residential land use zoning on each property, the HHRA evaluated cancer risks and non-cancer health hazards from exposure to surface soils. The exposure assessment assumed that soil at depths of less than two feet on the individual properties would be accessible to current and future residents. Potential exposure pathways and routes of exposure include incidental ingestion and dermal contact with chemicals in surface soil, and inhalation of fugitive dust. The exposure assumptions assumed residential exposures for a period of 30 years comprised of 6 years for a child (six years and younger) and 24 years for an adult(18 years and older). The residents were assumed to be exposed to soils for 350 days/year during the 30 year timeframe.

Chemicals identified with a Mutagenic Mode of Action (MMOA) such as PAHs and chromium assumed to have a valence state of VI were evaluated assuming the child is exposed for up to 16 years consistent with EPA guidance (USEPA, 2005a,b). In this case, the exposure duration for the adult was assumed to be 14 years which reflects the 30 year residential period minus 16 years for the child which equates to 14 years.

Exposures to future Construction Workers were evaluated qualitatively in the Risk Characterization portion of the HHRA based on the limited data on soil concentrations at depths greater than 2 feet. Construction workers may be exposed to chemicals in soils at depths greater than two feet depending on the type of construction. Workers are expected to be exposed for a shorter period of time than a resident based on the type of construction (e.g., less than one year compared to 30 years). Potential worker exposures would include ingestion and dermal contact with soils and inhalation of outdoor fugitive dust during construction.

Exposure assumptions used in the risk analysis were based on guidance obtained from EPA's Soil Screening Level Guidance (USEPA, 2002a,b), EPA's 1991 Standard Default Exposure Assumptions (USEPA, 1991), and other guidance documents. The HHRA recognizes that in 2011 EPA issued the updated Exposure Factors Handbook but application of these values requires USEPA's Office of Solid Waste and Emergency Response (OSWER) determinations regarding updates to current guidance.

Toxicity Assessment

The HHRA evaluated potential cancer risks and non-cancer hazards from direct exposure to soil and fugitive dust. Consistent with Superfund guidance, two types of adverse health effects were evaluated: (1) the incremental risk of developing cancer due to exposure to chemicals; and (2) the hazards associated with non-cancer health effects. The cancer risks are expressed as a probability of developing the disease and is based on the cancer potency of the chemical, known as a cancer slope factor (CSF). The non-cancer health hazard is expressed as the ratio of the chemical intake (dose) to a Reference Dose (RfD). The chronic RfD represents an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive populations such as a child, that is likely to be without an appreciable risk of deleterious effects during a lifetime. Chemical exposures exceeding the RfD, however, do not predict specific diseases. An inhalation Reference Concentration (RfC), comparable to the RfD, is used to evaluate non-cancer health effects from inhalation.

The HHRA used appropriate USEPA toxicity values selected based on the 2003 OSWER Toxicity hierarchy memo OSWER Directive 9285.7-53 (USEPA, 2003a). Sources of cancer and non-cancer toxicity values include USEPA's Integrated Risk Information System (IRIS), Provisional Peer-Reviewed Toxicity Values (PPRTV), and other sources including values developed by the California Environmental Protection Agency (CalEPA) and the Agency for Toxic Substances and Disease Registry (ATSDR).

Lead

Consistent with EPA's OSWER Directive #9355.4-12 guidance (USEPA, 1994) and updates in 2003 (USEPA 2003b,c) lead (Pb) was evaluated based on the mean Pb concentration compared to the residential soil Pb concentration of 400 parts per million (ppm). The Pb concentration of 400 ppm in soil represents a concentration where 95% of the population are expected to have blood Pb levels (BPb) of 10 micrograms/deciliter (ug/dl) or less. At the current time, EPA is evaluating the Centers for Disease Control and Prevention (CDC) recommendation to use a benchmark of 5 ug/dl and associated changes in the Pb toxicity models. This uncertainty will be discussed in the Risk Characterization section of the HHRA.

Risk Characterization

Risk characterization, the final step of the risk assessment process, combines the information from the Exposure Assessment and Toxicity Assessment steps of the HHRA to yield estimated non-cancer hazards and cancer risks from exposure to chemicals in soil. The risk characterization step also involves an evaluation of the uncertainty underlying the risk assessment process. The risk characterization was prepared in accordance with USEPA's guidance on risk characterization (USEPA 1995, 2000a).

Consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), USEPA uses the cancer risks and non-cancer Hazard Index (HI) calculated based on RME exposure values in determining whether conditions at the Site are above or below levels of concern (USEPA, 1990, 1991b). The Central Tendency Exposure (CTE) cancer risks and non-cancer hazards are also provided to more fully characterize the variability and uncertainty of the calculated cancer risk and non-cancer health hazards among individuals within the potentially exposed population, by describing the health effects associated with average exposures.

Cancer Risk Estimates.

For known or suspected carcinogens, acceptable exposure levels for Superfund sites are generally concentration levels that represent an incremental upper-bound lifetime cancer risk to an RME individual of 10^{-6} (one in a million) to 10^{-4} (one in ten thousand) (USEPA, 1990, 1991b). The RME estimate of the increased risk of an individual developing cancer are provided below.

The cancer risks at the following four properties exceeded the risk range.

- The total cancer risks on *Property C* were 1×10^{-3} (one in a thousand) for the RME resident and 2×10^{-4} (two in 10,000) for the CTE individual. The main chemicals contributing to the RME risks were benzo(a)pyrene with a risk of 7×10^{-5} (seven in 100,000) and chromium with a risk of 9×10^{-4} (nine in 10,000).

- The total cancer risks on *Property E* were 7×10^{-4} (seven in ten thousand) for the RME individual and 1×10^{-4} (one in 10,000) for the CTE individual. The main chemicals contributing to the risks were chromium VI with a risk of 5×10^{-4} (five in 10,000), benzo(a)pyrene with a risk of 6×10^{-5} (six in 100,000), and arsenic with a risk of 9×10^{-5} (nine in 100,000).

- The total cancer risks on *Property H* were 1×10^{-3} (one in 10,000) for the RME individual and 8×10^{-5} (eight in 100,000) for the CTE individual. The main chemicals contributing to the risk were benzo(a)pyrene with a risk of 5×10^{-4} (5 in 10,000), dibenzo(ah)anthracene with a risk of 1×10^{-4} (one in 10,000), chromium VI with a risk of 9×10^{-5} (nine in 100,000), and arsenic with a risk of 8×10^{-5} (eight in 100,000).

- The total cancer risks on *Property I* were 7×10^{-4} (seven in 10,000) for the RME individual and 1×10^{-4} (one in 10,000) for the CTE individual. The main chemicals were chromium VI with a risk of 6×10^{-4} (six in 10,000) and PCBs with a risk of 1×10^{-4} (one in 10,000) to the RME individual.

Cancer risks were within the upper bounds of the risk range at two properties. The risks on *Property B* were 2×10^{-4} (two in 10,000) for the RME individual and the CTE risks were 3×10^{-5} (three in 100,000).. The risks at *Property F* were 2×10^{-4} (two in 10,000) for the RME individual and the CTE risks were 2×10^{-5} (two in 100,000).

The cancer risks were within the risk range at three properties. The risks at *Property A* were 1×10^{-4} (one in 10,000) for the RME individual and the CTE risks were 2×10^{-5} (two in 100,000). The risks at *Property D* were 1×10^{-4} (one in 10,000) for the RME individual and the CTE risks were 3×10^{-5} (three in100,000). The risks at *Property G* were 1×10^{-4} (one in 10,000) to the RME individual and the CTE risks were 3×10^{-5} (three in 100,000).

Non-Cancer Hazard Estimates.

The evaluation of non-cancer health effects involves a comparison of average daily exposure levels with established RfDs and RfCs to determine whether estimated exposures exceed recommended limits to protect against chronic adverse health hazards. Chronic RfDs and RfCs are specifically developed to be protective for long-term exposure to a compound, with chronic duration ranging from seven years to a lifetime (USEPA, 1989).

Potential health hazards from non-cancer health effects are expressed as a Hazard Quotient (HQ) for individual chemicals and the individual HQs are combined to develop a total HI. The HQ compares the calculated exposures (average daily doses, calculated as part of the exposure assessment) to the RfD (summarized as part of the toxicity assessment). Both exposure levels and RfDs are typically expressed in units of mass of chemical intake per kilogram of body weight per day (mg/kg-day). Unlike the evaluation of carcinogenic effects, exposures of less than lifetime duration are averaged over the duration of exposures (USEPA, 1989).

For inhalation exposures, potential health hazards from non-cancer effects are expressed as a HQ which compares the calculated exposures (average daily doses, calculated as part of the exposure assessment) to the RfC. Both exposure levels and RfCs are typically expressed in units of mass of chemical in air per day (e.g., milligrams/cubic meter or micrograms/cubic meter). Unlike the evaluation of cancer effects, exposures of less than lifetime duration are averaged over the duration of exposures (USEPA, 1989). Similar to the evaluation using the RfD described above, individual HQs are combined to calculate a total HI.

Among the properties the HI was evaluated based on chemicals that exceeded the goal of protection of an HI = 1 and those that were at or below an HI = 1. The analysis found that the following properties had an HI > 1 associated with specific chemicals.

- The HI *for Property C* RME child was 5.4 (HI = 5.4) and for the RME adult was 0.5 (HI = 0.5). The main contaminants contributing to the HI were Chromium VI (HI = 2.3) and PCBs (HI = 1). The HI for the CTE child was 3 and for the adult was 0.3. The main contributor for the CTE child was chromium with an HI = 1.3 and PCBs with an HI = 0.4.

- The HI for *Property E* RME child was 8 (HI = 8.0) and for the RME adult was 1.0. The main contaminants contributing to the HI for the child were iron (HI = 1.9), PCBs (HI = 3.7), and cobalt HI = 0.8). The HI for the CTE child was 4 (HI = 4) and for the adult was 0.4 (HI = 0.4). The main contributors for the CTE child were Chromium VI (HI = 0.2), PCBs (HI = 1.6) and cobalt (HI = 0.4).

- The HI for *Property G* RME child was 3 (HI = 3.0) and for the RME adult was 0.3. The main contaminants contributing to the HI for the child were arsenic (HI = 0.8), iron (HI = 1) and manganese (HI = 0.4). The HI for the CTE child was 1 and for the adult was 0.2. The main contributors for the CTE child was arsenic (HI = 0.3), iron (HI = 0.5) and cobalt (HI = 0.1).

- The HI for *Property H* RME child was 9.5 (HI = 9.5) and for the RME adult was 1 (HI = 1). The main contaminants contributing to the HI for the child were arsenic (HI = 1.4) and PCBs (HI = 7.2). The HI for the CTE child was 4 (HI = 4) and for the adult was 0.8 (HI = 0.8). The main contributors for the CTE child was arsenic (HI = 0.6) and PCBs (HI = 3).

- The HI at *Property I* for the RME child was 26 (HI= 26) and for the adult was 3 (HI = 3). The main contaminant responsible for the HI was PCBs (i.e., HI = 24 for the child and HI = 3 for the adult). The CTE HI for the child was 11 and for the adult was 1. The main contributors for the CTE child was PCBs (HI = 10) and for the CTE adult was PCBs (HI = 1.1).

The HI for the RME child and adult were at one or lower for the following properties: *Property A* had an HI = 1 for child and HI = 0.1 for adult; *Property B* had an HI = 1 for child and HI = 0.1 for adult; *Property D* had an HI = 1 for the child and an HI = 0.2 for the adult; and *Property F* had an HI = 0.8 for the child and an HI = 0.1 for the adult.

Lead

Lead is evaluated based on a comparison of the average concentration in soils to a screening level of 400 ppm (USEPA, 2003b,c). The concentration of 400 ppm represents a concentration that is associated with no more than 5% of the population having a blood lead concentrations (BPb) greater than 5 ug/dl. The screening concentration of 400 ppm was exceeded at the following properties: *Properties* A (average concentration of 1,088 ppm), B (average concentration of 829 ppm), C (average concentration of 846 ppm), H (average concentration of 782 ppm), and I (average concentration of 741 ppm). The remaining properties had an average concentration of less than 400 ppm.

Uncertainty

Sources of uncertainty in the HHRA include:

Number of Samples. The number of samples from each of the properties varied. In general, as a result of the small number of samples the maximum concentration was used in the quantification of cancer risks and non-cancer hazards. This may potentially overestimate cancer risks and non-cancer hazards.

Land Use. Four of the nine properties are zoned residential but lack residential structures. Consistent with the residential zoning on these properties they were evaluated under a future residential scenario which may potentially overestimate risks based on the current land use.

Other Receptors. The samples were primarily collected at depths of less than 2 feet. Based on the depth of contamination, potential exposures to utility and construction workers who may be exposed to contamination at depth during construction activities could not be evaluated. This may result in potential underestimate of cancer risks and non-cancer health hazards.

Toxicity Values. The following chemicals lacked toxicity values: acenaphthylene, benzo(g,h,i)perylene, carbazole, and phenanthrene and the cancer risks and non-cancer hazards associated with these chemicals were not quantified. The lack of quantification of cancer risks and non-cancer health hazards may result in potential under estimates of cancer risks and non-cancer health hazards.

Uncertainties associated with specific chemicals included:

Chromium. The assessment assumed the all chromium concentrations were in the valence state of Chromium VI based on the absence of any speciated data on chromium. This assumption may potentially overestimate risks since it is possible that the a higher percentage of the concentration of Chromium in soil may exist in the Chromium III valence state.

Thallium. Thallium was screened into the analysis as a COPC for several properties (Properties C, E, G, H, and I). Based on the significant uncertainties associated with the toxicity value the toxicity information on this chemical could not be used in the HHRA. This may result in a potential underestimate of risks.

Lead. Recently, the CDC adopted a BPb concentration of 5 ug/dl as a protective level for young children. Currently, USEPA's OSWER is evaluating whether to change the current concentration used at Superfund sites from10 ug/dl to 5 ug/dl which would reduce the screening level for PB to a soil concentration lower than 400 ppm. The use of the current value may underestimate potential risks from exposure to Pb.

Major Findings of the HHRA.

The HHRA evaluated both cancer risks and non-cancer hazards to residents on nine residentially zoned properties. The assessment included the calculation of cancer risks and non-cancer health hazards and the evaluation of exposures to lead. Conclusions regarding individual properties are:

- *Property A.* The average Pb concentration in soils on this property exceeded the Pb screening level of 400 ppm. The cancer risks were within the risk range and the HI was equal to an HI = 1 or below.

- *Property B.* The average Pb concentration in soils on this property exceeded the lead screening level of 400 ppm. The cancer risks were within the risk range and the HI was equal to an HI = 1 or below.

- *Property C*. The cancer risk level exceeded the upper bounds of the risk range, the HI was greater than the goal of protection of an HI = 1. The average Pb screening level of 400 ppm in soil was exceeded on this property.

- *Property D*. The cancer risks were within the risk range and the HI was at equal to 1 or below. The average Pb screening level in soil was below 400 ppm.

- *Property E*. The cancer risk range was exceeded and the HI was greater than the goal of protection of an HI = 1. The average Pb soil concentration was below the screening level of 400 ppm.

- *Property F*. The cancer risks were within the risk range and the HI was equal to or below the goal of protection of an HI = 1. The average Pb screening level in soil of 400 ppm was not exceeded.

- *Property G*. The cancer risks were within the risk range but the noncancer goal of protection of an HI = 1 was exceeded. The average Pb screening level in soil was not exceeded.

- *Property H*. The cancer risk level exceeded the upper bounds of the risk range and the HI was greater than the goal of protection of an HI = 1. The average lead screening level of 400 ppm in soil was exceeded on this property.

- *Property I*. The cancer risk level exceeded the upper bounds of the risk range and the HI was greater than the goal of protection of an HI = 1. The average lead screening level of 400 ppm in soil was exceeded on this property.

1. OVERVIEW OF EIGHTEEN MILE CREEK HUMAN HEALTH RISK ASSESSMENT

1.1. Introduction

This document provides a baseline human health risk assessment (HHRA) for the Eighteen Mile Creek Superfund Site (the Site) to support risk-based remedial decisions as required under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (USEPA, 1990). The Site is located in the City of Lockport in the Town of Lockport in Niagara County, New York (USEPA ID#: NYN000206456). The HHRA quantifies cancer risks and non-cancer health hazards from exposure to chemicals in soil on nine residential properties located next to Eighteen Mile Creek. The HHRA is part of the Site Remedial Investigation/Feasibility Study (RI/FS) process and supports remedial decisions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Consistent with the NCP, this assessment evaluates both current and future risks to child and adult residents based on the assumption of no remediation or institutional controls (i.e., baseline conditions). Exposures to future construction workers are evaluated qualitatively in the Risk Characterization based on the limited data on soil contamination at depth.

This HHRA relies on sampling at the Site conducted by the New York State Department of Environmental Conservation (NYSDEC) in 2002 and 2005 on the individual properties (NYSDEC, 2006). The overall objective of this investigation was to further delineate the extent of soil contamination on the nine properties associated with contaminated fill material and flooding from the Creek. The risk information presented in this document follows EPA's Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Model Part A and Part D: Standardized Planning, Reporting and Review of Superfund Risk Assessment (USEPA, 1989, 2001).

1.2. Site Background

The Eighteen Mile Creek Corridor is bounded by Water Street and vacant land to the west, Upson Park to the south, Mill Street to the east and the former Flintkote property to the north as shown in Figure 1. The topography of the area is relatively flat with a steep downward slope toward the Creek and the millrace, which bisects the former Flintkote property. The area includes the Water Street properties, a stretch of Eighteen Mile Creek approximately 4,000 feet long, Upson Park, and several commercial and industrial properties.

This HHRA is designed to address the soil contamination on nine residentially zoned properties located next to the Eighteen Mile Creek. The properties are identified as A to I to protect confidentiality. An HHRA will be conducted for the sediments and commercial/industrial properties in the future.

The nine properties encompass an area of approximately 2.25 acres. Six properties are privately owned and five of the properties have residences. The remaining three properties are owned by the City of Lockport and are vacant (Properties A, C, and F). Flooding occurs on all nine properties during high water events. Severe flooding of up to 100 feet horizontally reportedly occurs approximately once every two years, with lesser flooding occurring several times a year as a result of heavy precipitation and blockage of culverts which allow the Eighteen Mile Creek to flow under William Street.

The Site also includes the contaminated sediments in the Creek Corridor (in the vicinity of the Residential Properties and the former Flintkote property) and contaminated soil at several industrial and commercial properties located within that Creek Corridor, and contaminated sediment in the Creek from the north end of the Corridor in Lockport to its location of discharge into Lake Ontario. USEPA anticipates that in the future it will conduct remedial investigations on these properties and USEPA will publish proposed plans to address other aspects, or operable units, at the Site.

1.3. Document Purpose

The purpose of this document is to provide an HHRA for the nine properties located along Eighteen Mile Creek. The HHRA process presented in this report has four components: data collection and evaluation, exposure assessment, toxicity assessment, and risk characterization (USEPA, 1989). The data collection and analysis step provides data on the nature and extent of chemical contamination in soils that is used in the calculation of cancer risks and non-cancer health hazards. The exposure assessment includes an identification of relevant human receptors and the mechanisms by which an individual may be exposed to chemicals on the Site, and a description of how exposure estimates will be derived. The toxicity assessment includes a summary of the toxicity data that will be used to evaluate the potential risks associated with site-related exposures. The risk characterization integrates the exposure estimates and toxicity data to quantify potential site-related human health cancer risks and non-cancer health hazards and associated uncertainties (USEPA 1995, 2000c).

1.4. Document Organization

In addition to this introduction, this report is organized into the following sections:

Section 2 The Sample Data section provides a description of the Site location and land uses that are relevant to the exposure assessment.

Section 3 The Quality Assurance/Quality Control Section describes the evaluation of data used in the HHRA.

Section 4 The General Risk Assessment Process Section characterizes the HHRA process.

Section 5 The Data Collection and Evaluation includes the selection of Chemicals of Potential Concern (COPCs) identifies data appropriate for inclusion in the HHRA and the COPCs that will be evaluated on each property.

Section 6 The Human Exposure Section includes potential human exposure pathways, exposure scenarios, exposure factors, and the equations used to estimate exposures.

Section 7 The Toxicity Section summarizes the toxicity factors used to quantify potential human health risks associated with Site COPCs.

Section 8 The Risk Characterization Section characterizes non-cancer hazards and cancer risks associated with exposures to COPCs in soil at the Site.

Section 9 The Uncertainty Section discusses the likely magnitude and direction of the uncertainty associated with the calculated cancer risks and non-cancer health hazards.

Section 10 The Risk Assessment Summary and Conclusions provides the HHRA results for the individual properties.

Section 11 The Preliminary Remediation Goals (PRGs) for COPCs greater than the goal of protection of 10^{-4} (one in ten thousand) are provided in this Section.

Section 12 The References Section identifies the documents cited in the HHRA.

2. SAMPLE DATA

Sampling at the site was conducted by NYSDEC in 2002 and 2005 on the individual properties (NYSDEC, 2006). The overall objective of this investigation was to further delineate the extent of soil contamination on these properties associated with flooding from the Eighteen Mile Creek (NYSDEC, 2006).

In general, surface soil samples were collected at depths of 0 to 2 feet. The contaminants evaluated included: polychlorinated biphenyls (PCBs) reported as Aroclors and summed to obtain a Total PCB concentration, metals (including lead), and semivolatile compounds including Polynuclear Aromatic Hydrocarbons (PAHs). A list of the sample locations for each property are provided below including identification of the data that was rejected and will not be used in the assessment.

Table 2.1. Summary of Property Specific Sample Locations and Identification of Rejected Data.

Property	Sample Locations*	Rejected Data
A	SS-21, SS-39, SS-40, SS-43, SB-4, SB-5	
B	SS-19, SS-20, SS-41, SS-42, SB-7	
C	SS-36, SS-37, SS-38, SB-9, SB-10, SB-11	
D	SS-18, SS-44, SB-14,	
E	SS-16, SS-35, SB-13A, SB-12, SB-13B (at varying depths), SB13C	
F	SS-17, SS-33, SS-34,	
G	SS-15, SS-31, SS-32, SB-15, SB-17	
H	SS-5, SS-8+, SS-9, SS-10, SS-13, SS-14, SS-25, SS-27, SS-30, SB-17, SB-19, SB-20,	SS-4
I	SS-11, SS-12+, SS-26, SS-28, SS-29, SB-23	SS-1, SS-2, SS-10FS, SP-6, SP-7 SS-15 for lead only

*SS indicates Surface Soil Samples and SB indicates Soil Borings.

3. DATA QUALITY ASSURANCE/QUALITY CONTROL

The data collected by NYSDEC was evaluated by USEPA to identify samples for use in the HHRA. The data evaluation concluded that the majority of the data was appropriate for use in the HHRA. Exceptions include samples located on Properties H and I as described in Table 2.1. Appendix A provides the summary sheets of the data evaluations conducted by the USEPA data validators to identify samples that meet appropriate requirements for inclusion in the HHRA.

The data qualifiers used in the HHRA to assess risks are:

- E – estimated concentrations due to the presence of interference (inorganics).
- J – compound reported at an estimated concentration below the sample quantitation limit.
- N – spike sample recovery or spike analysis is not within quality control limits (inorganics).
- N/A – compound not analyzed.
- ND – the compound was analyzed for but not detected at the detection limit in parentheses.
- SB – site background concentrations as determined during the Site Investigation of the Former Flintkote Plant Site.

4. HUMAN HEALTH RISK ASSESSMENT OVERVIEW

The goal of the HHRA is to provide a framework for developing the risk information necessary to assist in the determination of possible Site remedial actions. The risk assessment process was originally identified in 1983 (NRC, 1983). The HHRA is used to evaluate the toxicity of chemicals, evaluate the potential pathways and routes through which an individual may be exposed to contaminated environmental media, and characterization of the cancer risks and non-cancer health hazards at a Site currently and in the future (USEPA, 1989).

The HHRA followed USEPA guidance and policies on human health risk assessment. The HHRA methodology followed the guidance outlined in USEPA's Risk Assessment Guidance for Superfund (RAGS): Volume I, Human Health Evaluation Manual Part A and Part D (USEPA, 1989 and 2001, respectively). In addition, other relevant USEPA guidance and risk assessment policies were followed and are identified with appropriate citations in this document.

4.1. General Risk Assessment Process

The goal of the Superfund human health evaluation process is to provide a framework for developing the risk information necessary to assist in the determination of possible remedial actions at the Site (USEPA 1990, 1991b). USEPA uses risk assessment as a tool to characterize 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 and associated uncertainty (USEPA, 1989, 1992, 1995, 2000a). In accordance with USEPA guidance, actions at Superfund sites are based on an estimate of the reasonable maximum exposure (RME) expected to occur under current and/or future conditions at the Site. The RME is defined as the highest exposure that is reasonably expected to occur at a Site. USEPA guidance also recommends the Agency estimate risks based on central tendency exposures (CTE), or average exposures at a Site (USEPA, 1992, 1995, 2000a). The RME and CTE are used to estimate cancer risks and non-cancer health hazards although the RME serves as the basis for the remedial decision.

A systematic framework for human health risk assessment was first outlined in 1983 by the National Research Council of the National Academy of Sciences (NRC, 1983). Building upon that foundation, the risk assessment process described in USEPA's "Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)" (USEPA, 1989) and subsequent Agency guidance consists of the following components:

- *Data Collection and Evaluation* - involves gathering and evaluating soil data to define the nature and extent of contamination and property specific COPCs.

- *Exposure Assessment* - entails an estimate of the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (*i.e.*, inhalation of fugitive dust, ingestion of soil, and dermal contact with soil) by which people are potentially exposed. Actual and/or potential chemical release and transport mechanisms are identified, potentially-exposed human populations and possible exposure pathways are described, concentrations of COPCs at potential points of human exposures are determined, and human exposures to the COPC are estimated.

- *Toxicity Assessment* - examines the type of adverse health effects associated with chemical exposure, and the relationship of the magnitude of exposure and the health response. Qualitative and quantitative toxicity information for COPCs were summarized and toxicity values with which to characterize risks were identified.

- *Risk Characterization* - summarizes the results from the first three steps of the assessment (both quantitative and qualitative), the likelihood and magnitude of adverse health effects, in the form of incremental lifetime cancer risks and non-cancer Hazard Quotients (HQs), were estimated. Sources of uncertainty in the HHRA are noted and discussed.

The HHRA draws upon the data identified in Section 1.1. collected by NYSDEC in 2002 and 2005 (NYSDEC 2006).

4.2. Presentation of Property Data in RAGS Part D Format.

Appendix B provides separate RAGS Part D Tables for each property. The data is organized according to the RAGS Part D Table Format (USEPA, 2001).

RAGS Part D Table 1 provides the Conceptual Site Model (CSM) for each property including the identification of potential receptors and exposure pathways. Residences are located on five of the nine properties and these properties were evaluated as residential under current and future residential assumptions. The four remaining properties lack residential structures at the current time and these Properties (A, C, F and H) are evaluated under a future residential scenario based on the property zoning.

5. DATA COLLECTION AND EVALUATION

This part of the HHRA, describes the QA/QC of the data (Section 5.1) and the process used to select chemicals of significance for assessing human health risks i.e., Chemicals of Potential Concern (COPCs).

5.1. Data Quality Evaluation.

As described in Section 2, the data met appropriate QA/QC requirements and are appropriate for inclusion in the HHRA. Based upon a review of the available data validation reports (Appendix A), the data are of acceptable quality and the data qualifiers are identified as appropriate in the document and supporting Tables. Data flagged as rejected ("R") were removed from the analysis. Data assigned other qualifiers (e.g., indicating the numerical value is an estimated quantity or that the identity and quantity are based on presumptive evidence), were treated the same way as data without such qualifiers.

An Aroclor sampling method was used to collect PCB soil data. Aroclors are the commercial form of PCBs that were sold in the U.S. and not the weathered form of PCBs found in the environment. The chemical data sheets indicated that the majority of the Aroclors found in soils were Aroclors 1254 and 1260. The Aroclor data was summed to identify the Total PCBs and these values were used in the HHRA.

Chromium data was reported as total Chromium. To be protective of human health, all chromium was assumed to be Chromium VI. The potential that this assumption may overestimate risks is discussed in the Uncertainty Section of this Report (Section 9).

5.2. Selection of Chemicals of Potential Concern

The individual property COPCs were identified based on a comparison of the maximum concentrations of the individual chemicals in soils with residential Regional Screening Levels (RSLs). The RSL are established at a concentration in soil associated with a cancer risk to a resident of 10^{-6} (one in a million), or a non-cancer HQ = 0.1 to account for possible additivity of non-cancer health effects from the individual chemicals. The May 2013 Regional Screening Level (RSL) tables were used in this analysis and the tables are available at: http://www.epa.gov/region9/superfund/prg/. The RSLs for residential soils are based on a composite of exposures including ingestion of soil, dermal contact with soil, and inhalation of fugitive dust under residential exposures.

Chromium VI and arsenic were maintained as COPCs regardless of the screening. This decision is based on the classification of both chemicals as Known Human Carcinogens.

Chemicals lacking toxicity information, and associated RSL values, were evaluated qualitatively in the Risk Characterization section of the HHRA (see Section 8).

Appendix B RAGS Part D Table 2 series for each individual property identifies the COPCs. Each Table provides a comparison of the maximum soil concentration on each property with the RSL values and the Property specific COPCs. A summary of the COPCs are identified in Table 5.1.

Table 5.1. Property Specific Chemicals of Potential Concern Identified in RAGS Part D Table 2 Series.

Property	Chemicals of Potential Concern
A	Total PCBs, arsenic (inorganic), chromium VI, copper, and lead.
B	Arsenic, chromium VI, and lead.
C	Total PCBs, PAHS (benzo(a) anthracene, benzo(a)pyrene, benzo(b)fluoroanthene, dibenzo(a,h) anthracene, and Indeno(1,2,3-cd)pyrene) and metals (aluminum, arsenic (inorganic), chromium VI, cobalt, copper, iron, lead, manganese, and thallium (soluble salts*).
D	Total PCBs, arsenic and chromium VI.
E	Total PCBs, aluminum, inorganic arsenic, cadmium, chromium VI, cobalt, copper, iron, lead, manganese, mercury, thallium (soluble salts*), and zinc.
F	Total PCBs, arsenic (inorganic), chromium VI, copper, lead, and zinc.
G	Aluminum, arsenic (inorganic), chromium VI, cobalt, iron, manganese, and thallium (soluble salts*).
H	Total PCBs, PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b) fluoroanthene, benzo(k)fluoroanthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene); and metals (arsenic, chromium VI, cobalt, iron, lead and thallium (soluble salts*).
I	Aluminum, arsenic (inorganic) , chromium VI, cobalt, iron, manganese, and thallium (soluble salts*). PAHs were identified in one location and all samples were non-detects.

* The chemical thallium (soluble salts) was identified as a COPC at these properties. The toxicity value used in this analysis is based on a Provisional Peer Reviewed Toxicity (PPRTV) value that is designed to screen the chemical. This toxicity value is not recommended for use in the calculation of final cancer risks and non-cancer health effects and will be addressed in the uncertainty section of this report (Section 9).

6.0 EXPOSURE ASSESSMENT

The exposure assessment estimates the type and magnitude of human exposure to COPCs at each property based on assumptions regarding potential exposures (e.g., receptors, exposure frequency, exposure duration, etc.) to surface soils. The assumptions used are based on exposures to the RME individual that are likely to occur under current and future land-uses at each property. CTE evaluations are also calculated to provide information regarding exposure uncertainty and variability.

6.1. Exposure Areas

The Exposure Areas (EAs) evaluated in this analysis are the individual properties. Representative EPCs were calculated for each property, however, based on the small number of samples the majority of EPCs are based on the maximum concentration (see Appendix B - RAGS Part D Table 3 series for individual properties).

The potential for health effects following exposure to chemicals detected in soil was evaluated on each individual property under a residential exposure scenario. The majority of samples were collected at depths of 2 feet or less. Several samples were collected at depths ranging of 0.3 inches to 4 feet and these samples are evaluated as surface soil samples.

Only one sample was collected on Property E, the Soil Boring SB-130 collected at a depth of 4 feet. This sample was not used in the quantification of cancer risks and non-cancer health hazards based on the limitations of the data. This uncertainty is discussed qualitatively in the Risk Characterization section of this report (see Section 8).

6.2. Exposure Point Concentrations

The Exposure Point Concentrations (EPCs) provide the concentration use in the calculation of cancer risks and non-cancer health hazards from exposure to COPCs in soils under current and future exposure scenarios. Appendix B provides property specific RAGS Table 3.1 RME series Tables for each property representing soils at depths of less than 2 feet.

The calculated EPCs represent an estimated chemical concentration in soil to which a receptor is assumed to be continuously exposed. The 95% Upper Confidence Limit (95%UCL) on the mean of the data was considered the input concentration of a chemical used to estimate Property specific cancer risks and non-cancer health hazards.

To determine the chemical concentrations to which a resident may be exposed over many years, representative EPCs for COPCs in soil were calculated from available/useable data sets (see Section 2). The calculation included considerations regarding the number of detected and non detected data points. The USEPA (1989, 2002a,b, 2010a,b) recommends that the arithmetic average concentrations of the data be used for evaluating long-term exposure and that, because of the uncertainty associated with estimating the true average concentration at the site, the 95% UCL on the arithmetic average be used as the EPC (USEPA 2002a, 2010 a,b). The 95% UCL concentration provides reasonable confidence that the true average will not be underestimated. The computer program ProUCL, Version 4.1 developed by USEPA's Technology Support Center for Monitoring and Site Characterization was used to test the distributional assumptions and calculate the EPCs (USEPA, 2010a,b).

The ProUCL program recommends a minimum of 8 to 10 observations for statistical methods. A sample size of n = 5 may not be considered adequate to compute meaningful and reliable test statistics and estimates. In the case where the number of samples is less than 5 the maximum concentration is used as the EPC and is noted in the RAGS Part 3 Series spreadsheets for the individual chemicals on the individual properties (see Appendix B – RAGS Part D Table 3 series).

The ProUCL analysis datasheets for each property and COPC are provided in Appendix B and are identified as Tables 3.2 and higher. The ProUCL output provides a series of recommendations that were used in the HHRA. In cases where the calculated EPC did not exceed the maximum concentration the recommended EPC identified in the ProUCL output was used in the calculation of cancer risks and non-cancer health hazards. In instances where the 95% UCL concentration was greater than the maximum detected concentration, or where the data set was composed or less than five samples, the maximum detected concentration was used as the EPC (USEPA, 2002a,b).

The EPCs for COPCs in each property are presented in RAGS Part D Tables 3.1. The ProUCL output files are included in Appendix B for the surface soils at depths of less than 2 feet. Consistent with guidance (USEPA 2003a,b), the average concentration was calculated for lead to allow comparison with the residential Pb screening level of 400 ppm.

6.3. Potential Exposure Pathways.

The nine properties are zoned residential although four properties lack residential structures. For the purposes of this risk assessment, the current and future land uses are considered residential. Appendix 2, Table 1series provides Property specific CSMs. The Table includes information regarding Property time frame, medium, exposure medium, exposure point, human receptor population, receptor age, exposure route, type of analysis, and rationale for selection or exclusion of an exposure pathway.

Following is a list of the receptors on the Properties that may be exposed to COPCs in soils under a current/future residential scenarios. The Appendix B RAGs Part D Table 1 series provides individual CSMs for each individual property and identifies the receptors including a rationale for their inclusion or exclusion.

Current/Future Scenario

The current/future scenario assumes potential exposures to surface soils (less than 2 feet).

- *Adult/Child Residential Exposures:* Residents living on each individual property may be exposed to COPCs in the surface soils. Potential exposures pathways and routes of exposure include incidental ingestion of and dermal contact with COPCs in surface soil and exposure to fugitive dust.

- *Construction Workers (adults):* Construction workers may perform short-term or longer term intrusive work on the Site (e.g., utility installation, maintenance, or construction). Construction workers may be exposed to chemicals in all soil (greater than 4 feet) and outdoor air. Potential exposure pathways and routes of exposure include incidental ingestion of and dermal contact with COPCs in soil, and inhalation of fugitive dust. This pathway was evaluated qualitatively for all properties based on the limited available data on Property E or the lack of data at depths greater than 2 feet on the remaining properties.

Future Scenario

On four properties (Properties A, C, F, and H) exposures are evaluated based on future residential exposures. The receptors are identified above.

6.4. Reasonable Maximum and Central Tendency Exposures

The assessment evaluates exposures to the RME and CTE individuals but the remedial decision is based on the RME individual. The RME exposure scenario is expected to represent a high end, but not a worst case exposure scenario for the media of concern. The CTE exposure scenario provides information on average exposures that may occur. Different activity assumptions are evaluated for the RME and CTE receptors (i.e., days per year exposed, quantity of soil ingested, etc.). CTE analysis was performed for chemicals with risks greater than one in a million or an HI greater than 1, the goal of protection.

6.5. Receptors and Routes of Exposure

The following information summarizes potential exposures for the current/future resident.

- **Current/Future Residential Child**. The child, one to six years of age, is assumed to live on an individual property. The child may potentially be exposed through contact with soil via ingestion, dermal contact and inhalation of fugitive dust. he exposure assumes contact with soils in the top two feet based on available soils for a period of six years (USEPA, 1991a).

- **Current/Future Residential Adult**. An adult, older than 18 years, is assumed to live on an individual property. This receptor is potentially exposed through contact with soil via ingestion, dermal contact, and inhalation of fugitive dust.

- **Future Construction Worker**. An adult construction worker may come into contact with subsurface soil (greater than 4 feet in depth) or while working in a utility trench. The receptor is potentially exposed to COPCs in disturbed soil (i.e., surface and subsurface soils) via ingestion, dermal absorption, and inhalation fugitive dust emitted from soil. This pathway is evaluated qualitatively in the Risk Characterization (Section 8) based on the lack of soil data.

6.6 Evaluation of Exposures to Non-Lead Chemicals

For cancer risks and non-cancer hazards to be present, a complete exposure pathway for chemical contact and intake must exist. A complete pathway requires a source and methods for release of chemicals, a transport or retention media, a point of potential human contact (exposure point) with the affected media, and an exposure route (e.g., ingestion, dermal contact, and inhalation of fugitive dust) at the exposure point (USEPA, 1989; 1992). The exposure estimation methods and models used to evaluate cancer risks and non-cancer health hazards followed USEPA guidance (USEPA, 1989, 1992, 2002b, 2004, and 2009).

6.7. Quantification of Exposure.

In this section of the risk assessment, the basic approach for calculating human intake levels resulting from exposures to COPCs is presented. Exposure estimates represent the daily dose of a chemical taken into the body, averaged over the appropriate exposure period (i.e., Exposure Duration for chemicals evaluated based on non-cancer health effects and lifetime based on exposures to carcinogens). Chemical intake is expressed in terms of a dose, having units of milligram chemical per kilogram body weight per day (mg/kg-day). In general, quantitative exposure estimates involve the following:

- determination of EPCs (the concentration of COPCs in environmental media at the point of human exposure);
- identification of applicable human exposure models and input parameters (exposure frequency, duration, *etc*.); and
- estimation of human intakes using exposure algorithms.

6.7.1. Basic Exposure Equation.

The primary source for the exposure algorithms used in the risk assessment is USEPA's Risk Assessment Guidance for Superfund, Part A (RAGS) (USEPA, 1989, 2001). The generalized equation for calculating chemical intakes is:

$$Intake = \frac{C \times CR \times EF \times ED \times CF}{BW \times AT}$$

where:

I = *Intake* - the amount of chemical at the exchange boundary (mg/kg body weight/day)

C = *Exposure Point Concentration* - the chemical concentration contacted over the exposure period at the exposure point (*e.g.*, mg/kg-soil)

CR = *Contact Rate* - the amount of affected medium contacted per unit time or event (*e.g.*, soil ingestion rate in milligrams/day (mg/day))

EF = *Exposure frequency* - describes how often exposure occurs (days/year)

ED = *Exposure duration* - describes how long exposure occurs (years)

CF = *Conversion factor* - (kg/g)

BW = *Body weight* - the average body weight over the exposure period (kg)

AT = *Averaging time* - period over which exposure is averaged (days)

There are differences among individuals in intake rates, bodyweight, exposure frequencies and exposure durations that determine the adult and child extent of chemical exposures. Exposure parameters (*e.g.*, contact rate, exposure frequency, exposure duration, body weight) identified in the equation above describes the exposure of a receptor for a given exposure scenario. These values are the input parameters for the exposure algorithms used to estimate chemical intake in the equation above (USEPA, 1989; 1991b; 2002b). The general equation above is slightly modified for each pathway, and the specific exposure parameters for each pathway are summarized and discussed in detail for ingestion (Section 6.7.2), dermal exposure (Section 4.6.2) and inhalation of fugitive dust (Section 6.7.3).

The selection of RME parameters provide a "reasonable" maximum estimate of the daily intake (USEPA 1989). In other words, some inputs are set equal to mean values (e.g., body weight), and some inputs are set equal to upper bound values (e.g., ingestion rates, exposure frequency, and exposure duration), such that the resulting combination yields an estimate that is considered an RME (USEPA 1989). As noted above, because exposure parameters (e.g., intake rates, body weight, and exposure frequency) may change as a function of age, different values are used for children and adults.

Typically, the HHRA addresses intakes that are "average" or otherwise near the central portion of the range of possible exposures, and intakes that are near the upper end of the range (e.g., the 95th percentile). These two exposure estimates, evaluated in this HHRA, are the CTE and RME, respectively.

Exposure factors used to quantify exposures via the pathways identified above are presented in the USEPA (2001) RAGS Part D Table 4 series (Appendix B - Tables 4.1 through 4.11 for each individual property).

The averaging time (AT) depends on the type of toxic effect being assessed. When evaluating exposures for potential non-cancer health effects, intakes were calculated by averaging over the period of exposure. This is equivalent to the receptor-specific exposure duration (ED), described below, multiplied by 365 days/year. When evaluating potential carcinogenic risks, intakes were calculated by prorating the total cumulative intake over a lifetime (i.e., lifetime average daily intake). For calculation purposes, this is equal to 70 years multiplied by 365 days/year. This distinction is consistent with the hypothesis that the mechanism of action for each of these health effects endpoints is different. The approach for carcinogens was based on the assumption that a high dose received over a short period of time is equivalent to a corresponding low dose spread over a lifetime.

For each of the potentially complete exposure pathways identified in Table 2-1 for the individual properties in Appendix B, both RME and CTE estimates of exposure are calculated in this HHRA. The RME is the maximum exposure that is reasonably expected to occur at the site (USEPA, 1989). A combination of Agency-recommended values and were used for each of the input parameters. According to USEPA guidance (1995), CTE estimates are intended to reflect central estimates of exposure or dose, while RME estimates are intended to reflect persons at the upper end ("above about the 90th percentile") of the distribution. RME, or high-end, exposure estimates are within the range of possible exposures.

The selection of CTE parameters, the intake variables for a specific exposure pathway (e.g., body weight, ingestion rate, exposure frequency, exposure duration) are based on mean or median values, so that the CTE represents the "typical" or "average" exposure.

6.7.2. Soil Ingestion Exposure Equation

The amount of a chemical that is ingested is referred to as "intake" or "dose." For non-lead chemicals, exposure is quantified using an equation of the following general form:

$$I = \frac{C \times IR \times EF \times ED \times RBA}{BW \times AT}$$

where:

I = Daily intake of chemical (mg of chemical per kg of body weight per day).

C = Concentration of the chemical in the soil to which a resident maybe exposed. The units are mg/kg.

IR = Ingestion Rate (in soil). This factor provides an estimate of incidental intake of soil that may occur as a result of hand–to-mouth activity. The USEPA recommended soil incidental ingestion rates for children is 200 mg/day and for adults is 100 mg/day (USEPA, 1991). The incidental soil ingestion rate provides an estimate of the ingestion that may occur integrated over a variety of activities including ingestion of indoor dust.

The assumed exposures for the CTE individual is one-half that of the RME individual.

BW = Body weight of the exposed person (kg). Standard default body weights were used in the calculations. The mean BW for children ages 1 to 6 is 15 kg. The mean adult body weight is 70 kgs (USEPA 1991). The body weights for the RME adult and child are also assumed for the CTE individual.

EF = Exposure frequency (days/year). This describes how often a person is likely to be exposed to the soil over the course of a year. The standard default exposure assumption for residences of 350 days/year is assumed for both the RME and CTE individual (USEPA, 1991).

ED = Exposure duration (years). This describes how long a person is likely to be exposed to the contaminated medium during their lifetime. The RME exposure assumption is 24 years for an adult and 6 years for a young child for a total ED of 30 years.

The CTE exposure duration is a total of 9 years based on the 50th percentile assumption for residential properties. The ED was further divided into 6 years for the adult and 3 years for the child.

AT = Averaging time (days). This term specifies the length of time over which the average dose is calculated. Usually, two different averaging times are considered:

For non-cancer hazards, the averaging time is based on the exposure duration x 365 days/year.

For cancer risks, a "lifetime" exposure employs an averaging time of 70 years.

RBA = Relative bioavailability - is the fraction of an ingested dose that crosses the gastrointestinal epithelium and becomes available for distribution to internal target tissues and organ (USEPA 2007). An accurate assessment of human exposure to ingested chemicals requires knowledge of the amount of chemical absorbed from the gastrointestinal tract into the body from site media compared to the amount of absorption that occurred in the toxicity studies used to derive the toxicity factors. This ratio (amount absorbed from site media compared to the amount absorbed in toxicity tests) is referred to as RBA (USEPA, 2007).

Accounting for RBA is particularly important for ingested metals. In general, metals in soil or sediment exist in the form of mineral particles that are not rapidly solubilized in gastrointestinal fluids when ingested, while toxicity studies often utilize readily soluble forms of the test chemical. In the absence of data to the contrary, USEPA (1989) recommends assuming equal bioavailability of a chemical in soil, diet, and water (i.e., RBA = 1.0). Data are limited or absent for most chemicals (aside from lead). Therefore, RBA values are set to 100% for this assessment. This is considered to be a conservative (i.e., health-protective) assumption.

An RBA is available only for arsenic of 0.6 was used in the calculation consistent with guidance (USEPA 2013). The RBA for individual chemicals was assumed to be 1.

Because one or more exposure parameters (e.g., intake rates, body weight, and exposure frequency) may change as a function of age, exposure calculations for non-cancer hazards and cancer risks are performed separately for children and adults. In this HHRA, child (ages 1-6) were evaluated on all properties; children 6 to younger than 16 years were evaluated for chemicals with a Mutagenic Mode of Action (MMOA), and adults (>18) were evaluated for all chemicals.

Exposure factor values for the RME and CTE calculations for the ingestion pathway are summarized in Appendix B for each individual property in Tables 4.1 to 4.11.

6.7.3. Dermal Exposure Equation.

The estimated daily intake is the amount of chemical at the exchange boundary. A fundamental assumption is the assumption in the estimate of the dermally absorbed dose is that absorption continues long after the exposure has ended (USEPA, 2004). The final absorbed dose (DAevent) is estimated to be the total dose dissolved in the skin at the end of the exposure. Exposure to a chemical by the dermal pathway is generally expressed in terms of the amount of chemical that is absorbed into the body. The amount of a chemical absorbed across the skin is referred to as the dermally absorbed dose (DAD), which is quantified using an equation of the following general form (USEPA, 2004):

$$\text{Intake} = \frac{C_{soil} \times DA \times SA \times AF \times EF \times ED \times CF}{BW \cdot AT}$$

where:

Csoil = Concentration of chemicals in soil (mg/kg).

DA = Dermal Absorption Fraction - the dermal absorption fraction represents the amount of a chemical in contact with skin that is absorbed through the skin and into the bloodstream. Absorbed dose per event (mg of chemical per square centimeter of skin surface area per event). The dermal absorption rate of 14% used is based on the in vivo percutaneous absorption of PCBs from soil by rhesus monkeys (USEPA 1996). An absorption factor of 0.03 was used for inorganic arsenic (USEPA, 2004).

SA = Skin Surface Area Exposed (cm^2) - the surface areas to which an individual may be exposed were obtained from the USEPA Dermal Guidance (USEPA, 2004) and the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA 2002). The surface area used for the RME and CTE child was 2,800 cm^2 and for the adult was 5,700 cm^2.

AF = Adherence Factor (mg/cm^2) – the Adherence Factor reflects the amount of the chemical in soil that adheres to the skin per unit of surface area. The AF for the RME individual was 0.2 for the child and 0.07 for the adult (USEPA, 2002, 2004). The AF for the CTE individual was 0.01 for the adult and 0.04 for the child (USEPA, 2004).

EF = Exposure frequency (days/year) - as described above for soil ingestion, this parameter describes how often a person is likely to be exposed to the contaminated soil over the course of a typical year. The same EF factors were used for soil ingestion and dermal exposures.

ED = Exposure duration (years). As described above, this parameter describes how long a person is likely to be exposed to the contaminated medium during their lifetime. The same factors used for soil ingestion were used for dermal exposures.

EV = Event frequency (events/day). As described above, this parameter describes the number of times per day a person comes in contact with a COPC in soil. The same factors used for soil ingestion were used for dermal exposures.

BW= Body weight of the exposed person (kg). The same exposure factors used for soil ingestion were used for dermal exposures.

AT = Averaging time (days). This term specifies the length of time over which the average dose is calculated. The same exposure factors used for soil ingestion were used for dermal exposures.

Exposure factor values for the RME and CTE calculations for the ingestion pathway are summarized in Appendix B for each individual property in Tables 4.1 to 4.11.

6.7.4. Inhalation of Fugitive Dust.

Inhalation of fugitive dusts generated by wind erosion may be of concern under the residential scenario for semi-volatile organic compounds and metals in surface soils as described in the Soil Screening Level Guidance (see USEPA, 2002 page 4-16). The EPA was developed using Particulate Emission Factors (PEFs) and Volatilization Factors (VFs) (USEPA, 2002b).

6.7.4.1. Particulate Emission Factor

Inhalation of contaminants adsorbed to respirable particles (PM10) was assessed using a default PEF equal to 1.4 x 10^{+9} m^3/kg. This equation relates the contaminant concentration in soil with the concentration of respirable particles in the air due to fugitive dust emissions from contaminated soils. The generic PEF was derived using default values that correspond to a receptor point concentration of approximately 0.76 μg/m^3. The relationship is derived by Cowherd (1985) for a rapid assessment procedure applicable to a typical hazardous waste site, where the surface contamination provides a relatively continuous and constant potential for emission over an extended period of time (e.g., years). This represents an annual average emission rate based on wind erosion that should be compared with chronic health criteria. The equations and underlying science are provided in the Soil Screening Level guidance (USEPA 2002b).

6.7.4.2. Volatilization Factor

The soil-to-air 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 from the equation below using chemical-specific properties and either site-measured or default values for soil moisture, dry bulk density, and fraction of organic carbon in soil. The Soil Screening Guidance: User's Guide (USEPA 2002b) describes the development of the site measured values for these parameters.

VF is only calculated for volatile organic compounds (VOCs). VOCs, for the purpose of this guidance, generally are chemicals with a Henry's Law constant greater than or equal to 1 x 10^{-5};atm-m^3/mole and a molecular weight of less than 200 g/mole. The VOC status of a chemical is important for some exposure routes.

6.8. Exposures to Chemicals with a Mutagenic Mode of Action

Consistent with the USEPA's *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* (USEPA 2005b), chromium assumed to be Chromium VI and PAHs were evaluated based on a Mutagenic Mode of Action (MMOA). The MMOA analysis evaluates exposures to children 16 years and younger who may be exposed to these chemicals. As a result, the exposure assumptions for children younger than 6 years were augmented with the assessment of individuals six to less than 16 years. The exposure assumptions provided above were expanded to include additional assumptions for this age range and these are provided in Appendix B – Series 4 Tables identified with MMOA in the Title. In addition, the ED for adults were modified from 24 years to 14 years to accommodate the ED for the adolescent.

6.9. Evaluation of Exposures to Lead

Consistent with USEPA guidance (USEPA, 1994, 2003b), potential health effects of lead are evaluated differently from other compounds. Consistent with guidance (USEPA 2003a,b), the average concentration of Pb in soil is calculated. The average concentration is then compared to the lead screening level for residential exposures of 400 ppm based on the Integrated Exposure Uptake Biokinetic model used by USEPA to predict Pb concentrations in various media especially soil for areas where children (younger than six years) may be exposed.

7. TOXICITY ASSESSMENT

The toxicity assessment provides information on the relationship between the magnitude of exposure and the potential that an adverse health effect will occur. It involves determining whether exposure to a chemical can cause an increase in the incidence of a particular adverse health effect and characterizing the nature and strength of the evidence of causation. The toxicity information is then quantitatively evaluated and the relationship between the dose and the chemical received and the incidence of adverse health effects in the exposure population is evaluated.

7.1. Cancer Effects

For cancer effects, the toxicity assessment process has two components. The first is a qualitative evaluation of the weight of evidence (WOE) that the chemical does or does not cause cancer in humans. Typically, this evaluation is performed by USEPA (1986), using the system summarized below:

WOE Group	Meaning	Description
A	Known human carcinogen	Sufficient evidence of cancer in humans.
B1	Probable human carcinogen	Suggestive evidence of cancer incidence in humans.
B2	Probable human carcinogen	Sufficient evidence of cancer in animals, but lack of data or insufficient data in humans.
C	Possible human carcinogen	Suggestive evidence of carcinogenicity in animals
D	Cannot be evaluated	No evidence or inadequate evidence of cancer in animals or humans
E	Not carcinogenic to humans	Strong evidence that it does not cause cancer in humans

USEPA updated the WOE descriptions and its approach for evaluating the carcinogenic potential of environmental contaminants (USEPA 2005c). The WOE is a narrative discussion along with the following qualifiers: 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. However, many of the chemicals listed in RAGS Part D Table 6 may not reflect these new classifications since they are being updated through the Integrated Risk Information System (IRIS) process.

For chemicals that are considered potentially carcinogenic (i.e., classified in Group A, B1, B2, or C using USEPA 1986 cancer guidelines (USEPA 1986) or considered carcinogenic to humans, likely to be carcinogenic to humans, or those chemicals considered to have suggestive evidence of carcinogenic potential using the 2005 Cancer Guidelines (USEPA 2005)), the second part of the toxicity assessment is to describe the carcinogenic potency of the chemical. This is done by quantifying how the number of cancers observed in exposed animals or humans increases as the dose increases. Typically, it is assumed that the dose-response curve for cancer has no threshold (i.e., that any dose above zero is associated with an increased cancer risk that increases until high doses are reached). Thus, the most convenient descriptor of cancer potency is the slope of the dose-response curve at low doses (where the slope is still linear). This is referred to as the cancer slope factor (CSF), which has dimensions of risk of cancer per unit dose.

Estimating the CSF is often complicated by the fact that observable increases in cancer incidence usually occur only at relatively high doses, frequently in the part of the dose-response curve that is no longer linear. Thus, it is necessary to use mathematical models to extrapolate from the observed high dose data to the desired (but immeasurable) slope at low dose. To account for the uncertainty in this extrapolation process, USEPA typically employs the upper 95th confidence limit of the slope to provide a conservative (health-protective) estimate of the CSF.

7.2. Non-Cancer Effects

All chemicals can cause adverse health effects at a sufficient dose. However, when the dose is sufficiently low, typically no adverse effect is observed. Thus, in characterizing the non-cancer effects of a chemical, the key parameter is the threshold dose at which an adverse effect first becomes evident. Doses below the threshold are considered to be below levels of concern, while doses above the threshold may result in a potential effect.

The threshold dose is typically estimated from toxicological data (derived from studies of humans and/or animals) by finding the highest dose that does not produce an observable adverse effect, and the lowest dose that does produce an effect. These are referred to as the no-observed-adverse-effect level (NOAEL) and the lowest-observed-adverse-effect level (LOAEL), respectively. The threshold is presumed to lie between the NOAEL and the LOAEL. Non-cancer evaluations of oral exposure rely on the reference dose (RfD) as a health-protective estimate of the human toxicity threshold. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

The RfD is derived from toxicity data using uncertainty factors (UFs) that reflect limitations of the data used. If the data are from studies in humans, and if the observations are considered to be very reliable, the UF may be 1. However, the UF can range from 1 up to 3,000 based on the available toxicity data. UFs are assigned to account for uncertainty arising from extrapolation of animal data to humans, the use of a LOAEL instead of a NOAEL, the use of less-than-chronic exposure, and other limitations in the available data (e.g., lack of reproductive data, etc.). Use of UFs to derive the RfD ensures that the RfD is not higher than the “true” human threshold for adverse effects. Doses higher than the RfD may carry some hazard, but a dose above the RfD does not mean that an effect will necessarily occur.

7.3. Toxicity Values Used In Assessment.

USEPA (2003a) describes the recommended hierarchy for selecting toxicity values for use in human health risk assessment at Superfund sites. Generally, the first preference is for USEPA consensus values as listed in IRIS, an electronic database containing human health assessments for various chemicals (available online at http://www.epa.gov/iris/). If values are not available from IRIS, then the next preference is to seek Provisional Peer Reviewed Toxicity Values (PPRTVs) for Superfund developed by USEPA's Superfund Health Risk Technical Support Center (STSC). If PPRTVs are not available, toxicity values may be obtained from other sources, such as the Agency for Toxic Substances and Disease Registry's (ATSDR) minimal risk levels (MRLs) (available online at http://www.atsdr.cdc.gov/mrls/index.asp), California EPA's (CalEPA) Toxicity Criteria Database (available online at http://www.oehha.ca.gov/risk/ChemicalDB/index.asp), and USEPA's Health Effects Assessment Summary Tables (HEAST) (USEPA 1997).

Appendix B - Tables 5.1 and 6.1 series for the individual properties summarize the non-cancer and cancer oral toxicity values used for evaluating human health risks from chemicals at the Eighteen Mile Creek. There are several COPCs for which toxicity values are not available. As appropriate, the HHRA will address these COPCs qualitatively in the uncertainty section of the report (see Section 9).

7.3.1. Toxicity Values for Dermal Exposures

Oral toxicity factors are expressed in terms of toxicity per unit dose of chemical ingested, rather than in terms of toxicity per unit amount of chemical absorbed. However, the equations for characterizing dermal contact with chemicals provide exposure values that are based on absorbed dose rather than ingested dose. Thus, oral RfD and SF values must be adjusted for use in evaluating dermal exposures as follows:

RfD(dermal) = RfD(oral) · Oral absorption fraction

SF(dermal) = SF(oral) / Oral absorption fraction

Appendix B – RAGS Part D Tables 5.1 and 6.1 for the individual properties lists the absorption fractions (ABS_{GI}) used to adjust oral toxicity values for use in assessing dermal exposure, as recommended by USEPA (USEPA, 2004). If chemical-specific absorption fractions are not available, a value of 1.0 was assumed consistent with USEPA (2004) guidance (USEPA, 2004).

7.3.2. Toxicity Values for PCB Mixtures

PCBs consist of 209 individual congeners. Aroclors are commercial mixtures of PCB congeners that contain many of the individual congeners in varying ratios. When Aroclors are released into the environment, the original congener composition of the PCB mixture changes due to differential fate and transport processes. Chemical analyses of environmental samples often report PCB concentrations in terms of the Aroclor mixture(s) they most closely resemble. USEPA has developed RfDs for some (but not all) Aroclors, and when corresponding RfDs are available, the Aroclor-specific concentration data are compared to the Aroclor-specific RfD to assess potential non-cancer effects as described previously. The cancer potency of PCB mixtures is assessed using the USEPA SF of 2 $(mg/kg\text{-}day)^{-1}$, which is applied to the total PCB (total Aroclor) concentration data to assess PCB risks.

Carcinogenic Exposure to PCBs.

PCBs are classified as a Probable Human Carcinogen (USEPA, 1996). Total PCBs are recommended by IRIS and the use the toxicity criteria for PCBs are not the individual Aroclors are used in the cancer evaluation in this assessment.

The cancer potency of PCB mixtures is determined using a tiered approach that depends on the information available. Given the exposure scenarios in this risk assessment, the slope factors was chosen based upon high risk and persistence for this evaluation. The criteria (USEPA, 1996) for use of this category are:

- Food chain exposure
- Sediment or soil ingestion
- Dust or aerosol inhalation
- Dermal exposure, if an absorption factor has been applied
- Presence of dioxin-like, tumor-promoting, or persistent congeners
- Early-life exposure (all pathways and mixtures).

Non-cancer Toxicity

The evaluation of the potential for non-cancer (e.g., systemic) effects from exposure to non-carcinogens is based on the use of Reference Dose (RfDs), in units of mg/kg-day for oral and dermal exposures and on reference Concentrations in units of mg/m^3 for inhalation exposures. These toxicity criteria are estimates of daily exposure to the population (including sensitivity subpopulations) that are likely to be without appreciable risk of deleterious effects for the defined exposure period, subchronic or chronic. In general, the RfD and RfC are calculated by dividing the NOAEL or LOAEL derived from animal or human studies by an uncertainty and/or modifying factor.

RfDs and RfCs incorporate uncertainty factor that serve as a conservative downward adjustment of the numerical value and reflect scientific judgment regarding the data use to estimate the RfD/RfC. IRIS has non-cancer oral RfDs for Aroclors 1016 and 1254. For this analysis, the oral RfD for Aroclor 1254 was used in the assessment based on the finding of Aroclor 1254 in the soil samples.

Currently, IRIS lacks an inhalation Reference Concentration for PCBs. Based on the 1996 Reassessment for PCB toxicity, where an inhalation Cancer Slope Factor was derived from an oral CSF, an inhalation RfC was developed for Aroclor 1254.

7.3.3. Chromium

Chromium was sampled and reported as Total Chromium. Information on the specific species of the chemical was not provided. The assessment assumed the toxicity values for Chromium VI in the assessment.

7.3.4. Thallium Soluble Salts.

Thallium soluble salts were reported in the data sheets for chemicals analyzed at the site. The Provisional Peer Reviewed Toxicity Values (PPRTVs) available for this chemical are Screening Level Toxicity Values. This designation indicates that the toxicity information may be used in the screening of chemicals but not in the quantification of the risks. In this case, the chemical was identified as a COPC but the risks were not quantified and the results are discussed in the Uncertainty Section of this report (see Section 10).

8. RISK CHARACTERIZATION

The Risk Characterization step involves combining exposure estimates with toxicity information to generate incremental lifetime cancer risks and non-cancer hazards for each of the human exposure scenarios evaluated in the HHRA. This section presents and discusses the cancer risks and non-cancer health hazards from the analysis for each receptor.

8.1 Cancer Assessment

Cancer risks are expressed as the increased risk of developing cancer as a result of a given exposure to a given chemical. These "excess" cancer risks are summed across all carcinogenic chemicals and all exposure pathways for each receptor category. In general, USEPA considers excess cancer risks less than 1 in a million (expressed as 1×10^{-6}) to be so small as to be negligible, and risks above $1\text{x } 10^{-4}$ to be sufficiently large that some action may be necessary (USEPA 1991b). Excess cancer risks between 1×10^{-4} (one in 10,000) and 1×10^{-6} (one in 1,000,000) are generally evaluated on a case-by-case basis, and USEPA may determine that risks in this range warrant remedial action. The excess risk of cancer from ingestion and dermal exposure to a chemical is calculated as follows (USEPA 1989):

$$\text{Excess cancer risk} = 1 - \exp(-DI_L \cdot SF)$$

where:

exp = The exponential.

DI_L = Daily intake, averaged over a lifetime (mg/kg-day).

SF = Slope factor $(\text{mg/kg-day})^{-1}$.

In most cases (except when the product of $DI_L \cdot SF$ is larger than about 0.01), this equation may be accurately approximated by the following:

$$\text{Excess cancer risk} = DI_L \cdot SF$$

8.1.1. Evaluation of Carcinogens with a Mutagenic Modes of Action

For chemicals identified as having a mutagenic mode of action for carcinogenesis, cancer risks were estimated in accordance with the *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* (USEPA 2005b). In brief, because chemical-specific data are not available for these chemicals, the default age-dependent adjustment factors (ADAFs) were applied to the non-age-dependent CSF to account for differences in potency that may occur from exposure during early life (upto age 16 years). The supplemental guidance further indicates that any grouping of ages in the exposure assessment will need to be integrated with the ADAF age groupings to derive age group-specific risk estimates.

Of the COPCs identified in this assessment, PAHs and chromium VI are the only chemicals identified as having a mutagenic mode of action. Therefore, cancer risk for a young child (ages 1-6) and an adolescent (ages 6 to younger than 16) exposed to PAHs and chromium VI in soils were calculated to account for early-life susceptibility as follows:

$$Risk_i = C \cdot HIF_i \cdot SF \cdot ADAF_i$$

where:

$Risk_i$ = Excess cancer risk for age interval ‘i’.

C = Concentration of chemical in the exposure medium (e.g., mg/kg for sediment).

HIF_i = Human intake factor for the exposure medium for age interval ‘i’ (e.g., kg/kg-day for sediment).

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

$ADAF_i$ = Age-dependent adjustment factor for age interval ‘i’ (unitless).

The ADAFs recommended in USEPA (2005) were applied to the different age intervals as:

Age Interval (yrs)	**ADAF**
1-< 2	10
2-< 16	3

Appendix B – property specific Table 4 series tables summarize the age-adjusted exposure factors for assessing oral and dermal exposure to chemicals with a MMOA ion (i.e., PAHs and chromium VI) in soils on the individual properties.

Total risk to the individual is the sum of the risks across all age intervals:

$$\text{Total Risk}_{1\text{-}6} = \text{Risk}_{1\text{-}<2} + \text{Risk}_{2\text{-}\leq 6}$$

$$\text{Total Risk}_{7\text{-}<16} = \text{Risk}_{7\text{-}<11} + \text{Risk}_{11\text{-}<16}$$

8.2 Non-Cancer Assessment

The potential for non-cancer effects is evaluated by comparing the estimated exposure intake or dose for a receptor over a specified time period to a reference dose that represents the threshold exposure below which it is unlikely for even sensitive populations to experience adverse health effects (USEPA 1989). This ratio of estimated exposure dose to RfD is called a hazard quotient (HQ). If the HQ for a chemical is equal to or less than 1, there is less concern about non-cancer health effects. If the HQ exceeds 1, there is some possibility that non-cancer effects may occur. Non-cancer HQs for each chemical are calculated as described below (USEPA 1989):

$$HQ = DI / RfD$$

where:

DI = Daily intake (mg/kg-day).

RfD = Reference dose (mg/kg-day).

8.3 Combining Risks across Chemicals and Exposure Pathways

In this HHRA, the cancer risks and HQs for the CTE and RME receptors are summed across all pathways and all chemicals to develop total cancer risks and an HI for non-cancer health effects. These results are provided in Sections 8.4 and 8.5 (RAGS D Series 7 and 10 Tables are provided for individual properties including specific chemical and exposure pathway calculations). For non-carcinogenic effects, an initial estimate of the total non-cancer hazard is derived simply by summing the HQ values across all chemicals to calculate a hazard index (HI). If the HI is greater than 1, then it may be appropriate to examine individual chemical HQs and only sum HQs for COPCs that affect the same target tissue or organ system (e.g., the liver). This approach provides HIs for chemicals that affect the same target organs and have the same mode of action, consistent with USEPA (1989) guidance because chemicals that only cause toxicity in different tissues are not likely to produce additive effects. Target-organ-specific HIs are presented in the Appendix B - RAGS D Series 7 and 10 for the individual properties Tables for those chemicals for which target organ information was readily available.

8.4. Cancer Risk Summary

Individual cancer risks are expressed as unitless probabilities (i.e., 2 E-6 or 2 in 1,000,000) of a person developing cancer under specific exposure conditions. For known or suspected carcinogens, the NCP established risk levels within the range of 10^{-4} to 10^{-6} (i.e., 1 in 10,000 to 1 in 1,000,000) where actions are generally not needed (USEPA, 1990).

The cancer risks at four properties exceeded the risk range.

- The total cancer risks on *Property C* were 1 x 10^{-3} (one in a thousand) for the RME resident and 2 x 10^{-4} (two in 10,000) for the CTE individual. The main chemicals contributing to the RME risks were benzo(a)pyrene with a risk of 7 x 10^{-5} (seven in 100,000) and chromium with a risk of 9 x 10^{-4} (nine in 10,000).

- The total cancer risks on *Property E* were 7 x 10^{-4} (seven in ten thousand) for the RME individual and 1 x 10^{-4} (one in ten thousand) for the CTE individual. The main chemicals contributing to the risks were chromium 5 x 10^{-4} (five in 10,000), benzo(a)pyrene with a risk of 6 x 10^{-5} (six in 100,000), and arsenic with a risk of 9 x 10^{-5} (nine in 100,000).

- The total cancer risks on *Property H* were a total cancer risk of 1 x 10-3 (one in ten thousand) for the RME individual and 8 x 10^{-5} (eight in 100,000) for the CTE individual. The main chemicals contributing to the risk were benzo(a)pyrene with a risk of 5 x 10^{-4} (5 in 10,000), dibenzo(ah)anthracene with a risk of 1 x 10^{-4} (one in ten thousand), chromium with a risk of 9 x 10^{-5} (nine in one hundred thousand), and arsenic with a risk of 8 x 10^{-5} (eight in 100,000).

- The total cancer risks on *Property I* were 7 x 10^{-4} (seven in 10,000) for the RME individual and 1 x 10-4 (one in ten thousand) for the CTE individual. The main chemicals contributing to the risk were chromium IV with a risk of 6 x 10-4 (six in 10,000) and PCBs with a risk of 1 x 10-4 (one in 10,000) to the RME individual

Cancer risks were within the upper bounds of the risk range at two properties. The risks on *Property B* were 2 x 10^{-4} (two in 10,000) for the RME individual and the CTE risks were 3 x 10^{-5} (three in 100,000). The risks at *Property F* were 2 x 10^{-4} (two in 10,000) for the RME individual and the CTE risks were 2 x 10^{-5} (two in 100,000).

The cancer risks were within the risk range at three properties. The risks at *Property A* were 1 x 10^{-4} (one in ten thousand) for the RME individual and the CTE risks were 2 x 10^{-5} (two in one hundred thousand). The risks at *Property D* were 1 x 10^{-4} (one in ten thousand) for the RME individual and the CTE risks were 3 x 10^{-5} (three in one hundred thousand). The risks at *Property G* were 1 x 10^{-4} (one in ten thousand) to the RME individual and the CTE risks were 3 x 10^{-5} (three in one hundred thousand).

8.5. Non-Cancer Hazards Summary

Non-cancer health effects associated with exposure to COPCs was evaluated by calculating the ratio of an estimate intake over a specified time period with the Aroclor specific RfD derived for a similar exposure period. The RfD is an estimate 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. The non-cancer Hazard Quotient (HQ) therefore assumes there is a level of exposure (i.e., the RfD) below which it is unlikely for even sensitive subpopulations to experience adverse health effects. For the non-cancer assessment, exposure scenarios with an HQ greater than 1 are of concern.

Among the properties the HI was evaluated based on chemicals that exceeded the goal of protection of an HI = 1 and those that were at or below an HI = 1. The analysis found that the following properties had an HI > 1 associated with specific chemicals.

- The HI *for Property C* RME child was 5.4 (HI = 5.4) and for the RME adult was 0.5 (HI = 0.5). The main contaminants responsible for the HI were chromium (HI = 2.3) and PCB (HI = 1). The HI for the CTE child was 3 and for the adult was 0.3. The main contributor for the CTE child was chromium with an HI = 1.3 and PCBs with an HI = 0.4.

- The HI for *Property E* RME child was 8.0 (HI = 8.0) and for the RME adult was 1.0. The main contaminants contributing to the HI for the child were iron (HI = 1.9), PCBs (HI = 3.7), and cobalt HI = 0.8). The HI for the CTE child was 4 and for the adult was 0.4. The main contributors for the CTE child were chromium (HI = 0.2), PCBs (HI = 1.6) and cobalt (HI = 0.4).

- The HI for *Property G* RME child was 3 (HI = 3.0) and for the RME adult was 0.3. The main contaminants contributing to the HI for the child were arsenic (HI = 0.8), iron (HI = 1) and manganese (HI = 0.4). The HI for the CTE child was 1 and for the adult was 0.2. The main contributors for the CTE child was arsenic (HI = 0.3), iron (HI = 0.5) and cobalt (HI = 0.1).

- The HI for *Property H* RME child was 9.5 (HI = 9.5) and for the RME adult was 1. The main contaminants contributing to the HI for the child were arsenic (HI = 1.4) and PCBs (HI = 7.2). The HI for the CTE child was 4 and for the adult was 0.8. The main contributors for the CTE child was arsenic (HI = 0.6) and PCBs (HI = 3).

- The HI at *Property I* for the RME child was 26 (HI= 26) and for the adult was 3 (HI = 3). The main contaminant responsible for the HI was PCBs (i.e., HI = 24 for the child and HI = 3 for the adult). The CTE HI for the child was 11 and for the adult was 1. The main contributors for the CTE child was PCBs (HI = 10) and for the CTE adult was PCBs (HI = 1.1).

The HI for the RME child and adult were at one or lower for the following properties: *Property A* the HI = 1 for child and HI = 0.1 for adult); *Property B* HI = 1 for child and HI = 0.1 for adult); *Property D* with an HI for the child = 1 and for the adult = 0.2; and *Property F* HI for child was 0.8 and for adult the HI = 0.1.

8.6. Evaluation of Exposure to Lead

Lead is evaluated based on a comparison of the average concentration in soils to a level of 400 ppm (USEPA, 2003c). The concentration of 400 ppm represents a concentration that is associated with no more than 5% of the population having a blood lead level of greater than 5 ug/dl.

The screening concentration of 400 ppm was exceeded at the following properties: *Properties* A (average concentration of 1,088 ppm, B (average concentration of 829 ppm), C (average concentration of 846 ppm), H (average concentration of 782 ppm), and I (average concentration of 741 ppm).

9. UNCERTAINTY ASSESSMENT

Quantitative evaluation of human health risks due to environmental contamination is frequently limited by uncertainty regarding a number of key inputs, including chemical concentrations in the environment, the true level of human contact with contaminated media, and the true dose-response relationships for non-cancer and cancer effects in humans. This uncertainty is usually addressed by making assumptions or estimates for uncertain parameters based on available information. Because of these assumptions and estimates, the results of non-cancer hazard and cancer risk calculations are themselves uncertain, and it is important for risk managers and the public to keep this in mind when interpreting the results of a risk assessment. The following sections review the main sources of uncertainty in the non-cancer hazard and cancer risk calculations performed for the Site.

9.1 Chemicals Not Evaluated

As discussed above, exposure, non-cancer hazards and cancer risk were quantified only for a selected subset (the COPCs) of chemicals detected in environmental media. While omission of other chemicals might tend to underestimate total non-cancer hazards and cancer risks, this is not a significant source of uncertainty because the chemicals that were excluded were present at concentrations well below a level of concern.

9.2 Receptor Populations Not Evaluated

Several receptor populations were not evaluated quantitatively in this risk assessment (see Appendix B – RAGS Part D Tables 1.1 for the individual properties). Residents at the site are assumed to have exposures to the river/sediment equivalent to or less than that a recreational visitor experienced during such recreational activities within the river as wading and swimming. Risks to construction workers are not quantified in this assessment because possible construction activities in the Site are uncertain at this time. However, if construction activities occur in the future, risk associated with oral and dermal exposure to contaminated sediment and/or surface water should be evaluated.

9.3 Exposure Pathways Not Evaluated

As discussed above, humans may be exposed to site-related chemicals by a number of pathways, but not all of these pathways were evaluated quantitatively in this risk assessment (see Table 1.1). Based on the lack of data on chemical contamination at depths greater than 2 feet, the risks to the construction worker were not quantitatively evaluated. Typically, construction workers may be exposed during excavation of soils and future residents may be exposed to soils at the surface is the contaminated soils are not appropriately managed.

The lack of data on construction workers may result in an underestimate of cancer risks and non-cancer hazards especially if soils are not appropriately managed.

9.4 Exposure Point Concentrations

USEPA (1989, 1992) recommends that the EPC estimate be based on the 95UCL of the mean. This approach ensures that the "true" EPC is unlikely to be greater than the estimated EPC used in non-cancer hazard and cancer risk calculations. In addition, when calculated UCLs exceed the maximum detected concentration (due to limited data, etc.), the maximum detected concentration is used as the EPC, thereby assuring that the EPC is within the range of concentrations actually observed at the site.

When data are plentiful and inter-sample variability is not large, the UCL may be only slightly higher than the mean of the data. However, when data are sparse or are highly variable, the 95UCL may be far greater than the mean of the available data. At this site, most sediment data are of sufficient quantity and quality that the 95UCL of the mean is only moderately larger than the sample mean, so this source of uncertainty is relatively minor. 95UCL values computed based on the fish data are generally near the mean values of the available data, although for chemicals with a low detection frequency, the 95UCL is lower than the sample mean based on detected samples. Surface water data and some sediment data were inadequate for calculating 95UCLs ($n \leq 4$ or < 2 distinct detected values), so the maximum value was used at the EPC in the non-cancer hazard and cancer risk calculations. Such EPCs reflect the substantial uncertainty that exists when data are sparse or highly variable, and in general are likely to result in an overestimate of hazard or risk.

9.5 Chemical Absorption (RBA)

The risk from an ingested chemical depends on how much of the ingested chemical is absorbed from the gastrointestinal tract into the body. This issue is especially important for metals in soil and/or sediment, because some of the metals may exist in poorly absorbable forms, and failure to account for this may result in a substantial overestimation of exposure and non-cancer hazard or cancer risk. In the absence of data, the default approach is to assume that the RBA is 100% for most metals. Use of this default assumption is likely to overestimate the true hazard or risk, with the magnitude of the uncertainty depending on the true RBA value.

9.6 Human Exposure Parameters

Many of the required exposure parameters used to calculate exposure doses/intakes are not known with certainty and must be estimated from limited data or knowledge. For example, the amount of soil, sediment, and surface water ingested by recreational visitors are estimates often based on professional judgment. In general, when exposure data were limited or absent, the exposure parameters were chosen in a way that was intended to be conservative (health-protective). This approach is intended to produce results that are more likely to overestimate than underestimate actual exposure and non-cancer hazard or cancer risk.

9.7 Uncertainties in Toxicity Values

Toxicity information for many chemicals is often limited. Consequently, there are varying degrees of uncertainty associated with toxicity values (i.e., CSFs, RfDs). For example, uncertainties can arise from the following sources:

- Extrapolation from animal studies to humans
- Extrapolation from high dose to low dose
- Extrapolation from continuous exposure to intermittent exposure
- Limited or inconsistent toxicity studies

USEPA intentionally uses conservative approaches to develop toxicity factors to ensure that any uncertainties are more likely to result in an overestimation rather than an underestimation of non-cancer hazard or cancer risk.

Thallium soluble salts was screened into the analysis as a COPC for several properties (Properties C, E, G, H, and I). Based on the significant uncertainties associated with the toxicity value the toxicity information on this chemical could not be used in the HHRA. This may result in a potential underestimate of risks.

Cancer risk from the ingestion of chromium in fish tissue was assessed using the oral SF for hexavalent chromium of 0.5 $(mg/kg\text{-}day)^{-1}$ in the Regional Screening Level (RSL) Table as a tier three toxicity value. The RSL Table provides the following information regarding this value:

> "The New Jersey Department of Environmental Protection (NJDEP) recently determined that Cr(VI) by ingestion is likely to be carcinogenic in humans. NJDEP and derived a new oral cancer slope factor, based on cancer bioassays conducted by the National Toxicology Program (http://www.state.nj.us/dep/dsr/chromium/soil-cleanup-derivation.pdf). In addition, USEPA's Office of Pesticide Programs has concluded that the weight-of-evidence supports that Cr(VI) may act through a mutagenic mode of action following administration via drinking water and has also recommended that Age-Dependent Adjustment Factors (ADAFs) be applied when assessing cancer risks from early-life exposure (< 16 years of age).
>
> Both of these assessments are considered Tier 3 sources and were used to derive the screening levels for Cr VI. We applied ADAFs for early life exposure via ingestion and inhalation because OPP's proposed mutagenic mode of action for Cr(VI) occurs in all cells, regardless of type. Application of ADAFs for all exposure pathways results in more health-protective screening levels."

The current IRIS assessment (last updated September 1998 and currently being updated through the IRIS process) indicates that there is no evidence for carcinogenicity of Chromium VI by the oral route. Additionally, the oral CSF is based on Chromium VI, but chromium was only measured as total chromium at the Site Data are insufficient to determine the relative percentage of total chromium found as Chromium VI in soil at the Site. Thus, the approach of using the oral

SF of 0.5 (mg/kg-day)$^{-1}$ for Chromium VI from the RSL Table is a conservative (health-protective) approach and may overestimate actual risk.

9.8 Uncertainties in Risk Estimates

Because non-cancer hazard or cancer risk estimates for a chemical are derived by combining uncertain estimates of exposure and toxicity (see above), the hazard or risk estimates for each chemical are more uncertain than either the exposure estimate or the toxicity estimate alone. Additional uncertainty arises from the issue of how to combine hazard or risk estimates across different chemicals. In some cases, the effects caused by one chemical do not influence the effects caused by other chemicals. In other cases, the effects of one chemical may interact with effects of other chemicals, causing responses that are approximately additive, greater than additive (synergistic), or less than additive (antagonistic). In most cases, available toxicity data are not sufficient to define what type of interaction is expected, so USEPA generally assumes that effects are additive for carcinogens that act on all target organs/tissues and for non-carcinogens that act on the same target organ/tissue (USEPA 2000).

10. RISK ASSESSMENT SUMMARY AND CONCLUSIONS.

The HHRA evaluated both cancer risks and non-cancer hazards to residents on nine residentially zoned properties. The assessment included the calculation of cancer risks and non-cancer health hazards and the evaluation of exposures to lead. Conclusions regarding individual properties are:

- *Property A.* The average lead concentration in soils on this property exceeded the lead screening level of 400 ppm. The cancer risks were within the risk range and the HI was = 1 or below.
- *Property B*. The average lead concentration in soils on the property exceeded the lead screening level of 400 ppm. The cancer risks were within the risk range and the HI was = 1 or below.
- *Property C*. The cancer risk level exceeded the upper bounds of the risk range and the HI was greater than the goal of protection of an HI = 1. The average lead screening level of 400 ppm in soil was exceeded on this property.
- *Property D.* The cancer risks were within the risk range and the HI was equal to 1 or below. The average lead screening level in soil on this property was not exceeded.
- *Property E*. The cancer risk level was exceeded and the HI was greater than 1. The average lead concentration in soil on this property was below the Pb screening level of 400 ppm.
- *Property F*. The cancer risks were within the risk range and the HI was at 1 or below. The average lead screening level in soil on this property of an HI = 1 was not exceeded.
- *Property G*. The cancer risks were within the risk range but the noncancer HI = 1 was exceeded. The average Pb screening level in soil on this property was not exceeded.
- *Property H*. The cancer risk level exceeded the upper bounds of the risk range and the HI was greater than the goal of protection of an HI = 1. The average Pb screening level of 400 ppm in soil was exceeded on this property.
- *Property I.* The cancer risk level exceeded the upper bounds of the risk range and the HI was greater than the goal of protection of an HI = 1. The average lead screening level of 400 ppm in soil was exceeded on this property.

11. CALCULATION OF PRELIMINARY REMEDIATION GOALS

Preliminary Remediation Goals (PRGs) are calculated for COPCs exceeding the risk range and a non-cancer HI = 1 (USEPA 1991b). The following Table identifies the COPCs, the concentrations in soil associated with a cancer risk of 1 x 10^{-6} (one in 1,000,000), 1 x 10^{-5} (one in 100,000) and 1 x 10^{-4} (one in 10,000) and a non-cancer goal of protection of an HI = 1.

Table 11.1. Summary of PRGs for Chemicals in Residential Soils For COPCs Exceeding the Cancer Risk Range or a HI = 1.

Chemical	**10^{-6}**	**10^{-5}**	**10^{-4}**	**Non-Cancer HI = 1**
	ppm	ppm	ppm	ppm
Arsenic	0.61	6.1	61	34
Benzo-a-pyrene	0.015	0.15	1.5	
Dibenzo(ah) anthracene	0.015	0.15	1.5	
Chromium VI	0.29	2.9	29	230
Cobalt	370			23
Iron				55,000
PCBs	0.22	2.2	22	1
Lead	400			

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Appendix A

Introduction

Appendix A of EPA's Baseline Human Health Risk Assessment provides the list of the samples and applicable reports that evaluate and discuss the usability of the samples. In February 2013, EPA's Division of Environmental Science & Assessment (EPA-DESA) in Edison, NJ assessed the applicable laboratory analytical report and developed a summary of their findings. Result tables can be found at the end of Appendix A.

Samples discussed within the Baseline Human Health Risk Assessment were collected by New York State Department of Environmental Conservation (NYSDEC) in 2002 and 2005. NYSDEC samples were analyzed at STL Laboratories in Buffalo, New York. A discussion of sample results and their values can be found in NYSDEC's Remedial Investigation Report for the Eighteenmile Creek Corridor, dated September 2006.

Provided below is Table 1 is a list of all samples that were used in the Baseline Human Health Risk Assessment. Subsequent tables (2 through 6) of this appendix provide the EPA-DESA job report summaries.

Property ID	Sample Locations	Job Number	Inorganic	Organic	Rejected Data	Analysis
A	SS-21	A027443	x			Lead only
A	SS-39	A05C484	x	x		PCBs and Metals
A	SS-40	A05C484	x	x		PCBs and Metals
A	SS-43	A05C484	x	x		PCBs and Metals
A	SB-4	A05A718	x	x		PCBs and Metals
A	SB-5	A05A718	x	x		PCBs and Metals
B	SS-19	A027443	x			Lead only
B	SS-20	A027443	x			Lead only
B	SS-41	A05C484	x	x		PCBs and Metals
B	SS-42	A05C484	x	x		PCBs and Metals
B	SB-7	A05A718	x	x		PCBs and Metals
C	SS-36	A05C484	x	x		PCBs and Metals
C	SS-37	A05C484	x	x		PCBs and Metals
C	SS-38	A05C484	x	x		PCBs and Metals
C	SB-9	A05A718	x	x		PCBS, Metals, PAHs
C	SB-10	A05A718	x	x		PCB and Metals
C	SB-11	A05A718	x	x		PCBs and Metals
D	SS-18	A027443	x	x		PCBs and Metals
D	SS-44	A05C484	x	x		PCBs and Metals
D	SB-14	A05A987	x	x		PCBs and Metals
D	SB-14B	A05A987	x	x		PCBs and Metals
E	SS-16	A027443	x			Lead only
E	SS-35	A05C484	x	x		PCBs and Metals
E	SB-12	A05A987	x	x		PCBs and Metals

Property ID	Sample Locations	Job Number	Inorganic	Organic	Rejected Data	Analysis
Table 1 - Continued from previous page						
E	SB-13A	A05A987	x	x		PCBs and Metals
E	SB-13B	A05A987	x	x		PCBS, Metals, PAHs
E	SB-13C	A05A987	x	x		PCBs and Metals
F	SS-17	A027443	x			Lead only
F	SS-33	A05C484	x	x		PCBs and Metals
F	SS-34	A05C484	x	x		PCBs and Metals
G	SS-15	A027443	x			Lead only
G	SS-31	A05C484	x	x		PCBs and Metals
G	SS-32	A05C484	x	x		PCBs and Metals
G	SB-15	A05A987	x	x	x	PCBS, Metals, PAHs
H	SS-5	A027443	x			Lead only
H	SS-8	A027443	x	x		PCBs and Metals
H	SS-9	A027443	x	x		PCBs and Metals
H	SS-10	A027443	x	x		PCBs and Metals
H	SS-13	A027443	x			Lead only
H	SS-14	A027443	x			Lead only
H	SS-25	A05C484	x	x		PCBs and Metals
H	SS-27	A05C484	x	x		PCBs and Metals
H	SS-30	A05C484	x	x		PCBs and Metals
H	SB-17	A05A987	x	x		PCBS, Metals, PAHs
H	SB-19	A05A987	x	x		PCBS, Metals, PAHs
H	SB-20	A05B170	x	x		PCBS, Metals, PAHs
I	SS-11	A027443	x			Lead only
I	SS-12	A027443	x			Lead only
I	SB-23	A05B170	x	x		PCBs and Metals
I	SS-26	A05C484	x	x		PCBs and Metals
I	SS-28	A05C484	x	x		PCBs and Metals
I	SS-29	A05C484	x	x		PCBs and Metals

<u>Appendix A</u>: Table 2

Provided below is a list of samples where the analytical data was assessed for usability by EPA's Division of Environmental Science & Assessment in February 2013. Samples were collected by NYSDEC in July 2002 and were analyzed through STL Laboratories in Buffalo, New York. Discussion of these samples can be found in NYSDEC's Remedial Investigation for the Eighteenmile Creek Corridor dated September 2006.

Samples from Table 2 below are associated with either of the following reports:
<u>Job Number</u>: A027443 <u>Analysis</u>**:** Metals – Lead (Inorganic)
<u>Job Number</u>: A027443 <u>Analysis</u>**:** PCB (Organic)

Please note: A sample location with only an "x" checked in the "Inorganic" column was only analyzed for inorganics and therefore, results for that sample will only be contained in the report labeled "Job Number: A027443" with "Analysis: Metal (Lead)."

All samples discussed within either report labeled with "Job Number: A027443" were validated, but only samples provided in Table 2 below were used in the Baseline Human Health Risk Assessment for Eighteenmile Creek OU1.

Property ID	Sample Locations	Job Number	Inorganic	Organic	Rejected Data	Analysis
A	SS-21	A027443	x			Lead only
B	SS-19	A027443	x			Lead only
B	SS-20	A027443	x			Lead only
D	SS-18	A027443	x	x		PCBs and Metals
E	SS-16	A027443	x			Lead only
F	SS-17	A027443	x			Lead only
G	SS-15	A027443	x			Lead only
H	SS-5	A027443	x			Lead only
H	SS-8	A027443	x	x		PCBs and Metals
H	SS-9	A027443	x	x		PCBs and Metals
H	SS-10	A027443	x	x		PCBs and Metals
H	SS-13	A027443	x			Lead only
H	SS-14	A027443	x			Lead only
I	SS-11	A027443	x			Lead only
I	SS-12	A027443	x			Lead only

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
DESA/HWSB/HWSS
2890, Woodbridge Avenue, Edison, NJ 08837

EXECUTIVE NARRATIVE

Case No. : 2002
Site: Eighteen Mile Creek
Number of Samples: 18 Soil, 3 water
Analysis: Metals (Lead)

Job # A02-7443/**SDG** 0723
Laboratory: STL Buffalo
Sampling dates: July 23, 2002

QAPP
HWSS #: Not available.
Contractor Document #: Not available.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: Sample SED-7 has analyte qualified R.

Major Findings: None

Minor Findings: The lab reported receiving the sample coolers at ambient temperature.

COMMENT:	None

Reviewer Name(s): Israel Okwuonu

Approver's Signature: **Date: 01/23/2013**

Name: Muhammad H. Sheikh

Affiliation: USEPA/R2/HWSB/HWSS

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	**Explanation**		
	INORGANICS	**ORGANICS**	**CHLORINATED DIOXIN/FURAN**
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J–	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		*The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".*	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

DATA ASSESSMENT

ANALYSIS: METALS

The current SOP HW-2 (Revision 14) October 2011, USEPA Region II Data Validation SOP for Statement of Work ISOM01.2 for evaluating metals data has been applied. Data has been reviewed according to TDF specifications and the National Functional Guidelines report and analytical method requirements.

1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time, pH (aqueous samples), or cooler temperature are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (180 days), pH ($\leq$2), and cooler temperature ($\leq 10^0$ C) have not been met, will be qualified as estimated, "J"; the non-detects will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the Inorganic Target Analyte List (TAL). Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be used to establish each analytical curve. At least one of these standards shall be at or below the CRQL. The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The curve must have a correlation coefficient ≥ 0.995. The percent differences calculated for all of the non-zero standards must be within ±30% of the true value of the standard. The y-intercept of the curve must be less than the CRQL. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for each target analyte by the analysis of an ICV solution(s).

The CCV standard shall be analyzed at a frequency of every two hours during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last analytical sample. The percent recovery acceptable limits for ICV/CCV are 90 – 110%. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

3. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Calibration blanks (ICB and CCB) are used to ensure a stable instrument baseline before and during the analysis of analytical samples. The preparation blank is used to assess the level of contamination introduced to the analytical samples throughout the sample preparation process. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

4. **INTERFERENCE CHECK SAMPLE**

The Interference Check Sample (ICS) verifies the analytical instrument's ability to overcome interferences typical of those found in samples. The laboratory should have analyzed and reported ICS results for all elements being reported from the analytical run and for all interferents (target and non-target) for these reported elements. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and Solution AB consists of the analytes mixed with the interferents. Results for the analysis of ICS Solution AB must fall within the control limits of ± 20% of the true value (whichever is greater) for the analytes and interferents included in the solution. Results for the analysis of ICS Solution A must fall within the control limits of ± CRQL. If results that are ≥ MDL are observed for analytes that are not present in the ICS solution, the possibility of false positives exists. If negative results are observed for analytes that are not present in the ICS solution, and their absolute value is ≥ MDL, the possibility of false negatives in the samples exists. In general, ICP sample data can be accepted if the concentrations of Al, Ca, Fe, and Mg in the sample are found to be less than or equal to their respective concentrations in the ICS. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

5. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However, spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

6. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analyses are also performed to generate data that

determines the long-term precision of the analytical method on various matrices. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. Qualifications were applied to the samples and analytes as shown below.

The following duplicate and original sample results are greater than 5 X RL and RPD is ≥ 120. The original sample result ≥ RL has been rejected and qualified "R".

Lead SED-7

7. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision; therefore, the results may have more viability than lab duplicates which measure only lab precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. Qualifications were applied to the samples and analytes as shown below.

Not applicable.

8. LABORATORY CONTROL SAMPLE

The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Aqueous/water, soil/sediment, wipe, and filter LCSs shall be analyzed for each analyte utilizing the same sample preparations, analytical methods, and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples. All LCS Percent Recoveries (%R) must fall within the control limits of 70-130%, except for Sb and Ag which must fall within the control limits of 50-150%. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

9. ICP SERIAL DILUTION

The serial dilution of samples quantitated by Inductively Coupled Plasma determines whether or not significant physical or chemical interferences exist due to sample matrix. If the analyte concentration is sufficiently high [concentration in the original sample is > 50 times (50x) the Method Detection Limit (MDL)], the Percent Difference (%D) between the original determination and the serial dilution analysis (a five-fold dilution) after correction for dilution shall be less than 10. Qualifications were applied to the samples and analytes as shown below.

The following ICP- AES serial dilution (SD) sample has percent difference greater than 15% and the initial sample results is greater than 50 X MDLs. The detected analytes in sample with results greater than or equal to MDL are qualified J. Non-detected analytes are not qualified. Sample is rejected due to lab duplicate analysis.

Lead SED-7

10. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. All results of a sample with percent solids less than 50% are qualified estimated, "J". Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **REGION 2** **DESA/HWSB/HWSS** **2890, Woodbridge Avenue, Edison, NJ 08837**

EXECUTIVE NARRATIVE

CASE No.: 2002
Site: Eighteen Mile Creek.
Number of Samples: 6 (Soil)
Analysis: PCB

JOB No./SDG No.: A02-7443/0723
Laboratory: STL
Sampling dates: 07/23/2002

QAPP
HWSS #: Not applicable.
Contractor Document #: Not applicable.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: None.

Major Findings: None.

Minor Findings: None.

COMMENT:	None

Reviewer Name(s): Shobitha Capil

Approver's Signature: **Date: 01 / 23 / 2013**

Name: Russell Arnone

Affiliation: USEPA/R2/HWSB/HWSS

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	Explanation		
	INORGANICS	ORGANICS	CHLORINATED DIOXIN/FURAN
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J–	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		*The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".*	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

DATA ASSESSMENT

ANALYSIS: PCB

The current SOP HW-45/PCB (Revision 1) October 2006, USEPA Hazardous Waste Support Branch Validating PCB Compounds By Gas Chromatography SW-846 Method 8082A has been applied.

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

Spike compounds were diluted out.

4. Laboratory Control Samples (LCS):

The LCSs data provides information on the accuracy of the analytical method and laboratory performance. If LCS recoveries fell outside of the acceptable limits, qualifications were applied to the associated samples and compounds as shown below.

No problems found for this qualification.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the concentration of the analyte in the blank, the analytes are qualified as non-detects U. The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

No problem found for this qualification.

B) Field blank contamination:

Not applicable.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. 2nd Order Non Linear calibration model is used. The Calibration Verification checks document that the instrument is giving satisfactory daily performance.

A) Correlation coefficient R^2 and Percent Drift (%Drift):

For the initial calibration, if the value of the correlation coefficient R^2 is below 0.99 for a PCB qualify all associated positive results "J" and non-detects "UJ" for the PCB. If R^2 is below 0.99 for any surrogate qualify all associated positive results "J" and non-detects "UJ".

For the Calibration Verification checks, if Percent Drift (%Drift) exceeds 20% for any PCB or any surrogate, qualify all associated positive results “J” and non-detects “UJ”. Qualifiers are applied based on primary column calibration only.

No problems found for this qualification.

7. CONTRACT PROBLEMS NON-COMPLIANCE:
Calibration Verification checks:
Calibration Verification checks were not performed for all Target compounds.

8. FIELD DOCUMENTATION: No problems.

9. OTHER PROBLEMS:
Sample # D32110:
Sample has been analyzed at a Dilution Factor of 5.0. Target analytes are reported at levels below the CRQL.

10. This package contains re-extracted, re-analyzed or dilution runs. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.

None

Appendix A: Table 3

Provided below is a list of samples where the analytical data was assessed for usability by EPA's Division of Environmental Science & Assessment in February 2013. Samples were collected by NYSDEC in November 2005 and were analyzed through STL Laboratories in Buffalo, New York. Discussion of these samples can be found in NYSDEC's Remedial Investigation for the Eighteenmile Creek Corridor dated September 2006.

Samples from Table 3 below are associated with either of the following reports:
Job Number: A05C484 Analysis**:** Metals (Inorganic)
Job Number: A05C484 Analysis**:** PCB (Organic)

All samples discussed within either report labeled with "Job Number: A05C484" were validated, but only samples provided in Table 3 below were used in the Baseline Human Health Risk Assessment for Eighteenmile Creek OU1.

Property ID	Sample Locations	Job Number	Inorganic	Organic	Rejected Data	Analysis
A	SS-39	A05C484	x	x		PCBs and Metals
A	SS-40	A05C484	x	x		PCBs and Metals
A	SS-43	A05C484	x	x		PCBs and Metals
B	SS-41	A05C484	x	x		PCBs and Metals
B	SS-42	A05C484	x	x		PCBs and Metals
C	SS-36	A05C484	x	x		PCBs and Metals
C	SS-37	A05C484	x	x		PCBs and Metals
C	SS-38	A05C484	x	x		PCBs and Metals
D	SS-44	A05C484	x	x		PCBs and Metals
E	SS-35	A05C484	x	x		PCBs and Metals
F	SS-33	A05C484	x	x		PCBs and Metals
F	SS-34	A05C484	x	x		PCBs and Metals
G	SS-31	A05C484	x	x		PCBs and Metals
G	SS-32	A05C484	x	x		PCBs and Metals
H	SS-25	A05C484	x	x		PCBs and Metals
H	SS-27	A05C484	x	x		PCBs and Metals
H	SS-30	A05C484	x	x		PCBs and Metals
I	SS-26	A05C484	x	x		PCBs and Metals
I	SS-28	A05C484	x	x		PCBs and Metals
I	SS-29	A05C484	x	x		PCBs and Metals

	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **REGION 2** **DESA/HWSB/HWSS** **2890, Woodbridge Avenue, Edison, NJ 08837**

EXECUTIVE NARRATIVE

Case No. : 2005
Site: Eighteen Mile Creek
Number of Samples: 20 soil
Analysis: Metals

Job #: A05-C484
Laboratory: STL Buffalo
Sampling dates: 11/01/05 – 11/03/05

QAPP
HWSS #: Not available.
Contractor Document #: Not available.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: None.

Major Findings: Samples SS-34, SS-43 and SS-44 have analytes qualified "J".

Minor Findings: None.

COMMENT:	None

Reviewer Name(s): Constantin Stanca

Approver's Signature: **Date: 2/22/2013**

Name: Muhammad H. Sheikh

Affiliation: USEPA/R2/HWSB/HWSS

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	**Explanation**		
	INORGANICS	**ORGANICS**	**CHLORINATED DIOXIN/FURAN**
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J–	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

DATA ASSESSMENT

ANALYSIS: METALS ICP-AES

The current SOP HW-2a (Revision 15) December 2012, USEPA Region II Data Validation SOP for Statement of Work ISOM01.2 for evaluating metals data has been applied. Data has been reviewed according to TDF specifications, the National Functional Guidelines, and analytical method requirements.

1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time or pH (aqueous samples are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (180 days) or pH (<u><</u>2) have not been met, will be qualified as estimated, "J"; the non-detects will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the Inorganic Target Analyte List (TAL). Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be used to establish each analytical curve. At least one of these standards shall be at or below the CRQL. The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The curve must have a correlation coefficient ≥ 0.995. The percent differences calculated for all of the non-zero standards must be within ±30% of the true value of the standard. The y-intercept of the curve must be less than the CRQL. Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for each target analyte by the analysis of an ICV solution(s).
The CCV standard shall be analyzed at a frequency of every two hours during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last

analytical sample. The percent recovery acceptable limits for ICV/CCV are 90 – 110%. Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

3. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Calibration blanks (ICB and CCB) are used to ensure a stable instrument baseline before and during the analysis of analytical samples. The preparation blank is used to assess the level of contamination introduced to the analytical samples throughout the sample preparation process. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

4. **INTERFERENCE CHECK SAMPLE**

The Interference Check Sample (ICS) verifies the analytical instrument's ability to overcome interferences typical of those found in samples. The laboratory should have analyzed and reported ICS results for all elements being reported from the analytical run and for all interferents (target and non-target) for these reported elements. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and Solution AB consists of the analytes mixed with the interferents. Results for the analysis of ICS Solution must fall within the control limits of ± 20% or $\pm$CRQL (whichever is greater) of the true value for the analytes and interferents included in the solution. If results that are ≥ MDL are observed for analytes that are not present in the ICS solution, the possibility of false positives exists. If negative results are observed for analytes that are not present in the ICS solution, and their absolute value is ≥ MDL, the possibility of false negatives in the samples exists. In general, ICP sample data can be accepted if the concentrations of Al, Ca, Fe, and Mg in the sample are found to be less than or equal to their respective concentrations in the ICS. Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

5. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However, spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. For a matrix spike analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the matrix spike sample.

The following Matrix Spike samples have percent recoveries less than75% and post digestion spike was greater than 75%. Detected analytes with results greater than or equal to MDLs are qualified J. Nondetected analytes are qualified UJ.

Arsenic, Chromium, Copper SS-34

6. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. For a duplicate sample analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the duplicate sample.

No problems found for this criterion.

7. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. For field duplicates analysis that does not meet the technical criteria, the action was applied to only the field sample and it's duplicate.

Not applicable.

8. LABORATORY CONTROL SAMPLE

The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Aqueous/water, soil/sediment, wipe, and filter LCSs shall be analyzed for each analyte utilizing the same sample preparations, analytical methods, and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples. All LCS Percent Recoveries (%R) must fall within the control limits of 70-130%, except for Sb and Ag which must fall within the control limits of 50-150%. Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

9. ICP SERIAL DILUTION

The serial dilution of samples quantitated by Inductively Coupled Plasma determines whether or not significant physical or chemical interferences exist due to sample matrix. If the analyte concentration is sufficiently high [concentration in the original sample is > 50 times (50x) the Method Detection Limit (MDL)], the Percent Difference (%D) between the original determination and the serial dilution analysis (a five-fold dilution) after correction for dilution shall be less than 10. For a serial dilution analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the serial dilution sample.

The following ICP-AES Serial Dilution (SD) samples have percent difference (%D) greater than 15% and initial sample results are greater than 50xMDLs. The detected anlaytes in samples with results greater than or equal to MDLs are qualified J. Nondetected analytes are not qualified.

Chromium, Copper, Lead, Zinc SS-34

10. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. All results of a sample with percent solids less than 50% are qualified estimated, "J". Qualifications were applied to the samples and analytes as shown below.

The following samples have percent solids less than 50%.Detected and nondetected analytes are qualified J

Arsenic, Chromium, Copper, Lead, Zinc SS-43, SS-44

	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **REGION 2** **DESA/HWSB/HWSS** **2890, Woodbridge Avenue, Edison, NJ 08837**

EXECUTIVE NARRATIVE

CASE No.: 2005
Site: Eighteen Mile Creek.
Number of Samples: 20 (Soil)
Analysis: PCB

JOB /SDG No.: A05-C484
Laboratory: STL
Sampling dates: 11/1/2005-11/3/2005

QAPP
HWSS #: Not available.
Contractor Document #: Not available.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: None.

Major Findings: Samples SS-29, SS-30, SS-31, SS-34, SS-37, SS-38, SS-39, SS-41, SS-43 & SS-44 have analytes that have been qualified "J".

Minor Findings: None.

COMMENT:	None

Reviewer Name(s): Shobitha Capil

Approver's Signature: **Date: 02 / 22 / 13**

Name: Russell Arnone

Affiliation: USEPA/R2/HWSB/HWSS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
DESA/HWSB/HWSS
2890, Woodbridge Avenue, Edison, NJ 08837

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	**Explanation**		
	INORGANICS	**ORGANICS**	**CHLORINATED DIOXIN/FURAN**
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J–	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”.	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
DESA/HWSB/HWSS
2890, Woodbridge Avenue, Edison, NJ 08837

DATA ASSESSMENT

ANALYSIS: PCB

The current SOP HW-45/PCB (Revision 1) October 2006, USEPA Hazardous Waste Support Branch Validating PCB Compounds By Gas Chromatography SW-846 Method 8082A has been applied.

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems were found for this criterion.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following Aroclor samples have surrogate percent recoveries above the upper QC limit. Detected compounds are qualified J. Non detected compounds are not qualified.

Decachlorobiphenyl
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260, Aroclor-1262, Aroclor-1268

SS-25, SS-26, SS-27, SS-27MSD, SS-30, SS-31, SS-34, SS-37, SS-38, SS-41, SS-42, SS-44

The following aroclor samples have surrogate percent recoveries below the Lower QC limit. Detected compounds are qualified J. Non detected compounds are qualified UJ.

Tetrachloro-m-xylene
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260, Aroclor-1262, Aroclor-1268

SS-39

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

No problems were found for this criterion.

4. Laboratory Control Samples (LCS):

The LCSs data provides information on the accuracy of the analytical method and laboratory performance. If LCS recoveries fell outside of the acceptable limits, qualifications were applied to the associated samples and compounds as shown below.

No problems were found for this criterion.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the concentration of the analyte in the blank, the analytes are qualified as non-detects U. The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

No problems were found for this criterion.

B) Field blank contamination:

Not applicable.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. 2^{nd} Order Non Linear calibration model is used. The Calibration Verification checks document that the instrument is giving satisfactory daily performance.

A) Correlation coefficient R^2 and Percent Drift (%Drift):

For the initial calibration, if the value of the correlation coefficient R^2 is below 0.99 for any PCB or any surrogate qualify all associated positive results "J" and non-detects "UJ". Qualifiers are applied based on primary column calibration only.

For the Calibration Verification checks, if Percent Drift (%Drift) exceeds 20% for any PCB or any surrogate, qualify all associated positive results “J” and non-detects “UJ”. Qualifiers are applied based on primary column calibration only.

Calibration Verification check containing Target Aroclor was not performed at required frequency. Associated positive hits are qualified J.

Aroclor-1248
SS-29

7. CONTRACT PROBLEMS NON-COMPLIANCE:

Calibration Verification checks:
Calibration Verification checks were not performed for all Target compounds.

8. **FIELD DOCUMENTATION:** No problems.

9. **OTHER PROBLEMS:**

Percent Moisture:
Percent moisture content of the following soil samples are between 50% - 90%. Detected compounds are qualified J. Non detected compounds are qualified UJ.

SS-43 & SS-44

10. **This package contains re-extracted, re-analyzed or dilution runs. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.**

None.

<u>Appendix A</u>: Table 4

Provided below is a list of samples where the analytical data was assessed for usability by EPA's Division of Environmental Science & Assessment in February 2013. Samples were collected by NYSDEC in September 2005 and were analyzed through STL Laboratories in Buffalo, New York. Discussion of these samples can be found in NYSDEC's Remedial Investigation for the Eighteenmile Creek Corridor dated September 2006.

Samples from Table 4 below are associated with either of the following reports:
<u>Job Number</u>: A05A718 <u>Analysis</u>**:** Metals + Mercury (Inorganic)
<u>Job Number</u>: A05A718 <u>Analysis</u>**:** BNA, PCB (Organic)

All samples discussed within either report labeled with "Job Number: A05718" were validated, but only samples provided in Table 4 below were used in the Baseline Human Health Risk Assessment for Eighteenmile Creek OU1.

Property ID	Sample Locations	Job Number	Inorganic	Organic	Rejected Data	Analysis
A	SB-4	A05A718	x	x		PCBs and Metals
A	SB-5	A05A718	x	x		PCBs and Metals
B	SB-7	A05A718	x	x		PCBs and Metals
C	SB-9	A05A718	x	x		PCBS, Metals, PAHs
C	SB-10	A05A718	x	x		PCB and Metals
C	SB-11	A05A718	x	x		PCBs and Metals

	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **REGION 2** **DESA/HWSB/HWSS** **2890, Woodbridge Avenue, Edison, NJ 08837**

EXECUTIVE NARRATIVE

Case No. : 2005
Site: Eighteen Mile Creek
Number of Samples: 13 soil
Analysis: Metals + Mercury

Job #: A05-A718
Laboratory: STL Buffalo
Sampling dates: 9/27/05 – 9/28/05

QAPP
HWSS #: Not available.
Contractor Document #: Not available.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: None.

Major Findings: Samples SB-7 and TP-3 have analytes qualified "J".

Minor Findings: None.

COMMENT:	Matrix Spike and Laboratory Duplicate analyses were not performed for Total Metals samples.

Reviewer Name(s): Constantin Stanca

Approver's Signature: **Date: 2/22/2013**

Name: Muhammad H. Sheikh

Affiliation: USEPA/R2/HWSB/HWSS

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	Explanation		
	INORGANICS	ORGANICS	CHLORINATED DIOXIN/FURAN
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J–	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”.	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

DATA ASSESSMENT

ANALYSIS: METALS ICP-AES

The current SOP HW-2a (Revision 15) December 2012, USEPA Region II Data Validation SOP for Statement of Work ISOM01.2 for evaluating metals data has been applied. Data has been reviewed according to TDF specifications, the National Functional Guidelines, and analytical method requirements.

1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time or pH (aqueous samples are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (180 days) or pH ($\leq$2) have not been met, will be qualified as estimated, "J"; the non-detects will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the Inorganic Target Analyte List (TAL). Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be used to establish each analytical curve. At least one of these standards shall be at or below the CRQL. The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The curve must have a correlation coefficient ≥ 0.995. The percent differences calculated for all of the non-zero standards must be within ±30% of the true value of the standard. The y-intercept of the curve must be less than the CRQL. Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for each target analyte by the analysis of an ICV solution(s).
The CCV standard shall be analyzed at a frequency of every two hours during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last

analytical sample. The percent recovery acceptable limits for ICV/CCV are 90 – 110%. Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

3. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Calibration blanks (ICB and CCB) are used to ensure a stable instrument baseline before and during the analysis of analytical samples. The preparation blank is used to assess the level of contamination introduced to the analytical samples throughout the sample preparation process. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

The following samples have analyte results greater than or equal to MDLs but less than CRQLs. The associated ICB analyte results are greater than or equal to MDLs but less than or equal to CRQLs. Detected analytes are qualified U. Nondetected analytes are not qualified. Sample results are elevated to CRQLs.

Beryllium SB-1, SB-3, SB-9

Sodium SB-1, SB-2, SB-3, SB-9

The following samples have analyte results greater than or equal to MDLs but less than CRQLs. The associated CCB analyte results are greater than or equal to MDLs but less than or equal to CRQLs. Detected analytes are qualified U. Nondetected analytes are not qualified. Sample results are elevated at CRQLs.

Magnesium SB-2

Potassium SB-1

Sodium SB-1, SB-2, SB-3, SB-9

The following samples have analyte results greater than or equal to MDLs but less than CRQLs. The associated Preparation Blank analyte results are greater than or equal to MDLs but less than or equal to CRQLs. Detected analytes are qualified U. Nondetected analytes are not qualified. Sample results are elevated at CRQLs.

Beryllium SB-1, SB-3, SB-9

Potassium SB-1

Sodium SB-1, SB-2, SB-3, SB-9

4. **INTERFERENCE CHECK SAMPLE**

The Interference Check Sample (ICS) verifies the analytical instrument's ability to overcome interferences typical of those found in samples. The laboratory should have analyzed and reported ICS results for all elements being reported from the analytical run and for all interferents (target and non-target) for these reported elements. The ICS consists of two solutions: Solution A

and Solution AB. Solution A consists of the interferents, and Solution AB consists of the analytes mixed with the interferents. Results for the analysis of ICS Solution must fall within the control limits of ± 20% or ±CRQL (whichever is greater) of the true value for the analytes and interferents included in the solution. If results that are ≥ MDL are observed for analytes that are not present in the ICS solution, the possibility of false positives exists. If negative results are observed for analytes that are not present in the ICS solution, and their absolute value is ≥ MDL, the possibility of false negatives in the samples exists. In general, ICP sample data can be accepted if the concentrations of Al, Ca, Fe, and Mg in the sample are found to be less than or equal to their respective concentrations in the ICS. Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

5. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However, spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. For a matrix spike analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the matrix spike sample.

The following Matrix Spike samples have percent recoveries less than 75% and post digestion spike was greater than 75%. Detected analytes with results greater than or equal to MDLs are qualified J. Nondetected analytes are qualified UJ.

Copper SB-7

6. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. For a duplicate sample analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the duplicate sample.

No problems found for this criterion.

7. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. For field duplicates analysis that does not meet the technical criteria, the action was applied to only the field sample and it's duplicate.

Not applicable.

8. LABORATORY CONTROL SAMPLE

The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Aqueous/water, soil/sediment, wipe, and filter LCSs shall be analyzed for each analyte utilizing the same sample preparations, analytical methods, and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples. All LCS Percent Recoveries (%R) must fall within the control limits of 70-130%, except for Sb and Ag which must fall within the control limits of 50-150%. Qualifications were applied to the samples and analytes as shown below.

No problems found for this criterion.

9. ICP SERIAL DILUTION

The serial dilution of samples quantitated by Inductively Coupled Plasma determines whether or not significant physical or chemical interferences exist due to sample matrix. If the analyte concentration is sufficiently high [concentration in the original sample is > 50 times (50x) the Method Detection Limit (MDL)], the Percent Difference (%D) between the original determination and the serial dilution analysis (a five-fold dilution) after correction for dilution shall be less than 10. For a serial dilution analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the serial dilution sample.

No problems found for this criterion.

10. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. All results of a sample with percent solids less than 50% are qualified estimated, "J". Qualifications were applied to the samples and analytes as shown below.

The following samples have percent solids less than 50%.Detected and nondetected analytes are qualified J

Arsenic, Chromium, Copper, Lead, Zinc TP-3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
DESA/HWSB/HWSS
2890, Woodbridge Avenue, Edison, NJ 08837

EXECUTIVE NARRATIVE

Case No. : 2005
Site: EIGHTEEN MILE CREEK
Number of Samples: 13 (Soil)
Analysis: BNA, PCB

JOB/SDG No.: A05-A718
Laboratory: STL BUFFALO
Sampling dates: 09/27/05, 09/28/05

QAPP
HWSS #: Not applicable.
Contractor Document #: Not applicable.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: None.

Major Findings: **BNA:** All the associated samples have analytes that have been qualified "J".

PCB: Samples SB-1, SB-10, SB-11, SB-2, SB-3, SB-9 and TP-3 have analytes that have been qualified "J".

Minor Findings: None.

COMMENT:	None

Reviewer Name(s): Raxa J. Shelley

Approver's Signature: **Date: 02 / 22 / 13**

Name: Russell Arnone

Affiliation: USEPA/R2/HWSB/HWSS

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	Explanation		
	INORGANICS	ORGANICS	CHLORINATED DIOXIN/FURAN
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J–	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”.	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

DATA ASSESSMENT

ANALYSIS: BNA

The current SOP HW-22/SVOA (Revision 5) December 2010, USEPA Hazardous Waste Support Branch Validating Semivolatile Organic Compounds By Gas Chromatography/Mass Spectrometry SW-846 Method 8270D has been applied.

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data. Qualifications were applied to the samples and analytes as shown below.

The relative percent difference (RPD) between the following semivolatile matrix spike and matrix spike duplicate recoveries is outside criteria. No action was taken based on MS/MSD data.

Acenaphthene, Pyrene

4. Laboratory Control Samples (LCS):

The LCSs data provides information on the accuracy of the analytical method and laboratory performance. If LCS recoveries fell outside of the acceptable limits, qualifications were applied to the associated samples and compounds as shown below.

The following semivolatile LCS has percent recoveries that that are greater than the upper acceptance limit. Detected compounds are qualified J. Non-detected compounds are not qualified.

Phenol
Pentachlorophenol
SB-1, SB-2, SB-3, SB-9, SB-1MS, SB-1MSD, Method Blank (A5B1493902), Matrix Spike Blank (A5B1493901)

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the concentration of the analyte in the blank, the analytes are qualified as non-detects U. Qualifications were applied to the samples and analytes as shown below.

A) Method blank contamination:
No problems were found for this criterion.

B) Field blank contamination:
Not applicable.

6. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene and for semi-volatiles Decafluorotriphenyl-phosphine (DFTPP). If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems were found for this criterion.

7. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) and for SPCC compounds must be ≥ 0.05, in both the initial and continuing calibrations. A value < 0.05, indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

No problems were found for this criterion.

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 20% for target analytes and <30% for CCC compounds. %D must be < 20% for target analytes and for CCC compounds. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". For %RSD value outside criteria, non-detects are not qualified. If %RSD and %D grossly exceed QC criteria (>90%), non-detects data may be qualified "R". Qualifications were applied to the samples and analytes as shown below.

The following semivolatile samples are associated with an initial calibration percent relative standard deviation (%RSD) outside criteria. Detected compounds are qualified J. Non-detected compounds are not qualified.

Benzaldehyde
Hexachlorocyclopentadiene
2,4-Dinitrophenol
SB-1, SB-2, SB-3, SB-9, SB-1MS, SB-1MSD, Method Blank (A5B1493902), Matrix Spike Blank (A5B1493901)

The following semi volatile samples are associated with a CCV percent difference (%D) outside criteria. Detected compounds are qualified J. Non-detected compounds are qualified UJ.

Caprolactam
Hexachlorobutradiene
SB-1, SB-2, SB-3, SB-9, SB-1MS, SB-1MSD, Method Blank (A5B1493902), Matrix Spike Blank (A5B1493901)

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than □30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity. If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

9. COMPOUND IDENTIFICATION:

A) Semi-Volatile Fractions:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within □ 0.06 RRT units of the standard compound and have

an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

10. CONTRACT PROBLEMS NON-COMPLIANCE:
Hexachlorobutadiene: Percent Difference (%D) for CCC compound is outside criteria in continuing calibration check.

11. FIELD DOCUMENTATION: No problems were identified.

12. OTHER PROBLEMS: None.

13. DILUTIONS, RE-EXTRACTIONS and REANALYSIS:

Samples may be reanalyzed after dilution, re-extraction and for other QC reasons. In such cases, the best result values are consolidated in one single report and the other report is marked as not to be used. The following reports were identified as not to be used

None.

ANALYSIS: PCB

The current SOP HW-45/PCB (Revision 1.1) December 2010, USEPA Hazardous Waste Support Branch Validating PCB Compounds By Gas Chromatography SW-846 Method 8082A has been applied.

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded. Qualifications were applied to the samples and analytes as shown below.

No problem found for this criterion.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following aroclor samples with dilution factors less than or equal to 5 have surrogate percent recoveries that are greater than 200%. Detected compounds are qualified J. Non-detected compounds are not qualified.

Decachlorobiphenyl TP-3
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260

Tetrachloro-m-xylene TP-3
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260

The following aroclor samples have surrogate percent recoveries greater than 150% but less than or equal to 200%. Detected compounds are qualified J. Non-detected compounds are not qualified.

Decachlorobiphenyl SB-7
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260

The following aroclor samples have surrogate percent recoveries less than 30% but greater than 10%. Detected compounds are qualified J. Non-detected compounds are qualified UJ.

Decachlorobiphenyl SB-1, SB-2, SB-3, SB-9, SB-3MS
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260

Tetrachloro-m-xylene SB-1, SB-10, SB-11, SB-2, SB-9, SB-3MS
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data. Qualifications were applied to the samples and analytes as shown below.

The following aroclor matrix/matrix spike duplicate samples have percent recoveries that are less than the lower acceptance limit but greater than 20%. Detected compounds are qualified J. Non-detected compounds are qualified UJ.

Aroclor-1016 SB-3, SB-3MS, SB-3MSD
Aroclor-1260 SB-3, SB-3MS, SB-3MSD

4. Laboratory Control Samples (LCS):

The LCSs data provides information on the accuracy of the analytical method and laboratory performance. If LCS recoveries fell outside of the acceptable limits, qualifications were applied to the associated samples and compounds as shown below.

No problem found for this criterion.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the concentration of the analyte in the blank, the analytes are qualified as non-detects U. Qualifications were applied to the samples and analytes as shown below.

A) Method blank contamination:
No problem found for this criterion.

B) Field blank contamination:
Not applicable.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. 2nd Order Non Linear calibration model is used. The Calibration Verification checks document that the instrument is giving satisfactory daily performance.

A) Correlation coefficient R^2 and Percent Drift (%Drift):

For the initial calibration, if the value of the correlation coefficient R^2 is below 0.99 for any PCB or any surrogate qualify all associated positive results "J" and non-detects "UJ". Qualifiers are applied based on primary column calibration only.

For the Calibration Verification checks on primary column, if Percent Drift (%Drift) exceeds 15% for any PCB or any surrogate, qualify all associated positive results “J” and non-detects “UJ”. Qualifiers are applied based on primary column calibration only. On the confirmation column, if Percent Drift (%Drift) exceeds 50% for any PCB, qualify all associated positive results “J”.

No problem found for this criterion.

7. CONTRACT PROBLEMS NON-COMPLIANCE: None.

8. FIELD DOCUMENTATION: No problems were identified.

9. OTHER PROBLEMS:
Percent moisture content of the following aroclor soil samples are greater than or equal to 50% but less than or equal to 90%. Detected compounds are qualified J. Non-detected compounds are qualified UJ.
TP-3

10. DILUTIONS, RE-EXTRACTIONS & REANALYSIS:

Samples may be reanalyzed after dilution, re-extraction and for other QC reasons. In such cases,

the best result values are consolidated in one single report and the other report is marked as not to be used. The following reports were identified as not to be used

None.

Appendix A: Table 5

Provided below is a list of samples where the analytical data was assessed for usability by EPA's Division of Environmental Science & Assessment in February 2013. Samples were collected by NYSDEC in October 2005 and were analyzed through STL Laboratories in Buffalo, New York. Discussion of these samples can be found in NYSDEC's Remedial Investigation for the Eighteenmile Creek Corridor dated September 2006.

Samples from Table 5 below are associated with either of the following reports:
Job Number: A05A987 Analysis: Metals, Hg (Inorganic)
Job Number: A05A987 Analysis: PCB (Organic)

All samples discussed within either report labeled with "Job Number: A05A987" were validated, but only samples provided in Table 5 below were used in the Baseline Human Health Risk Assessment for Eighteenmile Creek OU1.

Property ID	Sample Locations	Job Number	Inorganic	Organic	Rejected Data	Analysis
D	SB-14	A05A987	x	x		PCBs and Metals
D	SB-14B	A05A987	x	x		PCBs and Metals
E	SB-12	A05A987	x	x		PCBs and Metals
E	SB-13A	A05A987	x	x		PCBs and Metals
E	SB-13B	A05A987	x	x		PCBS, Metals, PAHs
E	SB-13C	A05A987	x	x		PCBs and Metals
G	SB-15	A05A987	x	x	x	PCBS, Metals, PAHs
H	SB-17	A05A987	x	x		PCBS, Metals, PAHs
H	SB-19	A05A987	x	x		PCBS, Metals, PAHs

	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **REGION 2** **DESA/HWSB/HWSS** **2890, Woodbridge Avenue, Edison, NJ 08837**

EXECUTIVE NARRATIVE

Case No. : 2005
Site: Eighteen Mile Creek
Number of Samples: 9 Soil
Analysis: Metals, Hg

Job # A05-A987
Laboratory: STL Buffalo
Sampling dates: October 3, 2005

QAPP
HWSS #: Not available.
Contractor Document #: Not applicable.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: Sample SB-15 has analyte qualified R.

Major Findings: Sample SB-15 has analytes qualified J.

Minor Findings: None

COMMENT:	None

Reviewer Name(s): Israel Okwuonu

Approver's Signature:

Date: 2/22/2013

Name: Muhammad H. Sheikh

Affiliation: USEPA/R2/HWSB/HWSS

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	**Explanation**		
	INORGANICS	**ORGANICS**	**CHLORINATED DIOXIN/FURAN**
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J–	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		*The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".*	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

DATA ASSESSMENT

ANALYSIS: METALS

The current SOP HW-2 (Revision 14) October 2011, USEPA Region II Data Validation SOP for Statement of Work ISOM01.2 for evaluating metals data has been applied. Data has been reviewed according to TDF specifications and the National Functional Guidelines report and analytical methods.

1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time, pH (aqueous samples), or cooler temperature are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (180 days), pH (<u><</u>2), and cooler temperature (<u><</u>10^0 C) have not been met, will be qualified as estimated, "J"; the non-detects will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the Inorganic Target Analyte List (TAL). Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be used to establish each analytical curve. At least one of these standards shall be at or below the CRQL. The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The curve must have a correlation coefficient ≥ 0.995. The percent differences calculated for all of the non-zero standards must be within ±30% of the true value of the standard. The y-intercept of the curve must be less than the CRQL. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for each target analyte by the analysis of an ICV solution(s).
The CCV standard shall be analyzed at a frequency of every two hours during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last

analytical sample. The percent recovery acceptable limits for ICV/CCV are 90 – 110%. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

3. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Calibration blanks (ICB and CCB) are used to ensure a stable instrument baseline before and during the analysis of analytical samples. The preparation blank is used to assess the level of contamination introduced to the analytical samples throughout the sample preparation process. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

The following samples have analyte results greater than or equal to MDLs but less than CRQLs. The associated CCB analyte results are greater than or equal to MDLs but less than or equal to CRQLs. Detected analytes are qualified U. Non-detected analytes are not qualified. Sample results are elevated to CRQLs.

Beryllium SB-13B, SB-15, SB-17

Silver SB-15, SB-17, SB-19

Calcium SB-17

Cobalt, Potassium SB-17, SB-19

The following samples have analyte results greater than or equal to MDLs but less than CRQLs. The associated preparation blank analyte results are greater than or equal to MDLs but less than or equal to CRQLs. Detected analytes are qualified U. Non-detected analytes are not qualified. Sample results are elevated to CRQLs.

Silver SB-15, SB-19

Calcium, Magnesium, Silver SB-17

4. **INTERFERENCE CHECK SAMPLE**

The Interference Check Sample (ICS) verifies the analytical instrument's ability to overcome interferences typical of those found in samples. The laboratory should have analyzed and reported ICS results for all elements being reported from the analytical run and for all interferents (target and non-target) for these reported elements. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and Solution AB consists of the analytes mixed with the interferents. Results for the analysis of ICS Solution AB must fall within the control limits of ± 20% of the true value (whichever is greater) for the analytes and interferents included in the solution. Results for the analysis of ICS Solution A must fall within the control limits of ± CRQL. If results that are ≥ MDL are observed for analytes that are not present in the ICS solution, the possibility of false positives exists. If negative results are observed for analytes that are not present in the ICS solution, and their absolute value is ≥ MDL, the possibility of false negatives in the samples exists. In general, ICP sample data can be accepted if the concentrations of Al, Ca,

Fe, and Mg in the sample are found to be less than or equal to their respective concentrations in the ICS. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

5. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However, spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. Qualifications were applied to the samples and analytes as shown below.

The following matrix spike samples have percent recoveries less than 30% and post digestion spike was greater than 75%. Detected analytes with results greater than or equal to MDLs are qualified J. Non-detected analytes are qualified UJ.

Antimony SB-15

The following matrix spike sample has percent recovery greater than 125% and post digestion spike recovery was less than 125%. Detected analytes with results greater than or equal to MDLs are qualified J. Non-detected analytes are qualified UJ.

Manganese SB-15

6. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. Qualifications were applied to the samples and analytes as shown below.

The following Duplicate and original sample results are greater than 5 X CRQL and the RPD is greater than or equal to 120%. Detected analytes greater than CRQL are rejected and qualified R. Non-detected analytes are not qualified.

Lead SB-15

The following Duplicate and original sample results are greater than 5 X CRQL and the RPD is greater than 35% but less than 120%. Detected analytes greater than CRQL are qualified J. Non-detected analytes are not qualified.

Zinc SB-15

7. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision; therefore, the results may have more viability than lab duplicates which measure only lab precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. Qualifications were applied to the samples and analytes as shown below.

Not applicable

8. LABORATORY CONTROL SAMPLE

The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Aqueous/water, soil/sediment, wipe, and filter LCSs shall be analyzed for each analyte utilizing the same sample preparations, analytical methods, and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples. All LCS Percent Recoveries (%R) must fall within the control limits of 70-130%, except for Sb and Ag which must fall within the control limits of 50-150%. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

9. ICP SERIAL DILUTION

The serial dilution of samples quantitated by Inductively Coupled Plasma determines whether or not significant physical or chemical interferences exist due to sample matrix. If the analyte concentration is sufficiently high [concentration in the original sample is > 50 times (50x) the Method Detection Limit (MDL)], the Percent Difference (%D) between the original determination and the serial dilution analysis (a five-fold dilution) after correction for dilution shall be less than 10. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

10. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. All results of a sample with percent solids less than 50% are qualified estimated, "J". Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **REGION 2** **DESA/HWSB/HWSS** **2890, Woodbridge Avenue, Edison, NJ 08837**

EXECUTIVE NARRATIVE

Case No. : 2005
Site: EIGHTEEN MILE CREEK
Number of Samples: 9 (Soil)
Analysis: BNA, PCB

JOB/SDG No: A05-A987
Laboratory: STL BUFFALO
Sampling dates: 10/03/05

QAPP
HWSS #: Not applicable.
Contractor Document #: Not applicable.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: None.

Major Findings: **BNA:** Samples SB-13B, SB-15, SB-17 and SB-19 have analytes that have been qualified "J".
PCB: All the associated samples have analytes that have been qualified "J".

Minor Findings: None.

COMMENT:	None

Reviewer Name(s): Raxa J. Shelley/ Archana Mirle

Approver's Signature: **Date: 02 / 22 / 13**

Name: Russell Arnone

Affiliation: USEPA/R2/HWSB/HWSS

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	**Explanation**		
	INORGANICS	**ORGANICS**	**CHLORINATED DIOXIN/FURAN**
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J–	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”.	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

DATA ASSESSMENT

ANALYSIS: BNA

The current SOP HW-22/SVOA (Revision 5) December 2010, USEPA Hazardous Waste Support Branch Validating Semivolatile Organic Compounds By Gas Chromatography/Mass Spectrometry SW-846 Method 8270D has been applied.

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data. Qualifications were applied to the samples and analytes as shown below.

The following semi-volatile matrix/matrix spike duplicate samples have percent recoveries that are below the lower acceptance limit. No action was taken based on MS/MSD data.

N-Nitroso-Di-n-propylamine, Pentachlorophenol, 4-Nitrophenol

The following semi-volatile matrix/matrix spike duplicate samples have percent recoveries that are above the upper acceptance limit. No action was taken based on MS/MSD data.

Pyrene

The relative percent difference (RPD) between the following semi volatile matrix spike and matrix spike duplicate recoveries is outside criteria. No action was taken based on MS/MSD data.

Phenol, 2-Chlorophenol, N-Nitroso-Di-n-propylamine, 4-Chloro-3-methylphenol, Acenaphthene, 4-Nitrophenol, 2,4-Dinitrotoulene, Pentachlorophenol, Pyrene

4. Laboratory Control Samples (LCS):

The LCSs data provides information on the accuracy of the analytical method and laboratory performance. If LCS recoveries fell outside of the acceptable limits, qualifications were applied to the associated samples and compounds as shown below.

The following semi volatile LCS percent recoveries were above the upper acceptance limit. Detected compounds are qualified J and non-detected compounds are not qualified.

Pentachlorophenol SB-13B, SB-15, SB-17, SB-19, SB-13BMS, SB-13BMSD, Matrix Spike Blank (A5B1533701), Method Blank (A5B1533702)

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the concentration of the analyte in the blank, the analytes are qualified as non-detects U. Qualifications were applied to the samples and analytes as shown below.

A) Method blank contamination:
No problems were found for this criterion.

B) Field blank contamination:
Not applicable.

6. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene and for semi-volatiles Decafluorotriphenyl-phosphine (DFTPP). If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems were found for this criterion.

7. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) and for SPCC compounds must be ≥ 0.05, in both the initial and continuing calibrations. A value < 0.05, indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

No problems were found for this criterion.

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 20% for target analytes and <30% for CCC compounds. %D must be < 20% for target analytes and for CCC compounds. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". For %RSD value outside criteria, non-detects are not qualified. If %RSD and %D grossly exceed QC criteria (>90%), non-detects data may be qualified "R". Qualifications were applied to the samples and analytes as shown below.

The following semi volatile samples are associated with an initial calibration percent relative standard deviation (%RSD) outside criteria. Detected compounds are qualified J. Non-detected compounds are not qualified.

Benzaldehyde SB-13B, SB-15, SB-17, SB-19, SB-13MS, SB-13MSD, Matrix Spike Blank (A5B1533701), Method Blank (A5B1533702)

Hexachlorocyclopentadiene SB-13B, SB-15, SB-17, SB-19, SB-13MS, SB-13MSD, Matrix Spike Blank (A5B1533701), Method Blank (A5B1533702)

2,4-Dintrophenol SB-13B, SB-15, SB-17, SB-19, SB-13MS, SB-13MSD, Matrix Spike Blank (A5B1533701), Method Blank (A5B1533702)

The following semi volatile samples are associated with an opening CCV percent difference (%D) outside criteria. Detected compounds are qualified J. Non-detected compounds are qualified UJ.

Benzaldehyde SB-13B, SB-15, SB-17, SB-19, SB-13BMS, SB-13MSD, Matrix Spike Blank (A5B1533701), Method Blank (A5B1533702)

2,4-Dinitrophenol SB-13B, SB-15, SB-17, SB-19, SB-13BMS, SB-13MSD, Matrix Spike Blank (A5B1533701), Method Blank (A5B1533702)

4-Nitroaniline SB-13B, SB-15, SB-17, SB-19, SB-13BMS, SB-13MSD, Matrix Spike Blank (A5B1533701), Method Blank (A5B1533702)

Pentachlorophenol SB-13B, SB-15, SB-17, SB-19, SB-13BMS, SB-13MSD, Matrix Spike Blank (A5B1533701), Method Blank (A5B1533702)

Hexachlorocyclopentadiene SB-15, SB-17, SB-19

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than □30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity. If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

9. COMPOUND IDENTIFICATION:

A) Semi-Volatile Fractions:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within □ 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

10. CONTRACT PROBLEMS NON-COMPLIANCE: None.

11. FIELD DOCUMENTATION: No problems were identified.

12. OTHER PROBLEMS: None.

13. DILUTIONS, RE-EXTRACTIONS and REANALYSIS:

Samples may be reanalyzed after dilution, re-extraction and for other QC reasons. In such cases, the best result values are consolidated in one single report and the other report is marked as not to be used. The following reports were identified as not to be used

None.

ANALYSIS: PCB

The current SOP HW-45/PCB (Revision 1.1) December 2010, USEPA Hazardous Waste Support Branch Validating PCB Compounds By Gas Chromatography SW-846 Method 8082A has been applied.

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded. Qualifications were applied to the samples and analytes as shown below.

No problem found for this criterion.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The following aroclor samples with dilution factors less than or equal to 5 have surrogate percent recoveries that are greater than 200%. Detected compounds are qualified J. Non-detected compounds are not qualified.

Decachlorobiphenyl SB-13B
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260

The following aroclor samples have surrogate percent recoveries greater than 150% but less than or equal to 200%. Detected compounds are qualified J. Non-detected compounds are not qualified.

Decachlorobiphenyl SB-13C, SB-15
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data. Qualifications were applied to the samples and analytes as shown below.

Not applicable.

4. Laboratory Control Samples (LCS):

The LCSs data provides information on the accuracy of the analytical method and laboratory performance. If LCS recoveries fell outside of the acceptable limits, qualifications were applied to the associated samples and compounds as shown below.

No problem found for this criterion.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the concentration of the analyte in the blank, the analytes are qualified as non-detects U. Qualifications were applied to the samples and analytes as shown below.

A) **Method blank contamination:**
No problem found for this criterion.

B) **Field blank contamination:**
Not applicable.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. 2nd Order Non Linear calibration model is used. The Calibration Verification checks document that the instrument is giving satisfactory daily performance.

A) **Correlation coefficient R^2 and Percent Drift (%Drift):**

For the initial calibration, if the value of the correlation coefficient R^2 is below 0.99 for any PCB or any surrogate qualify all associated positive results "J" and non-detects "UJ". Qualifiers are applied based on primary column calibration only.

For the Calibration Verification checks on primary column, if Percent Drift (%Drift) exceeds 15% for any PCB or any surrogate, qualify all associated positive results "J" and non-detects "UJ". Qualifiers are applied based on primary column calibration only. On the confirmation column, if Percent Drift (%Drift) exceeds 50% for any PCB, qualify all associated positive results "J".

Calibration Verification check containing Target Aroclor was not performed at required frequency. Associated detected aroclor are qualified J.

Aroclor-1248
SB-13A, SB-13B, SB-13C

The following aroclor samples are associated with a CCV with % Difference exceeding criteria for primary column. Detected compounds are qualified J. Non-detected compounds are qualified UJ.

Tetrachloro-m-xylene
SB-12, SB-13A, SB-13B, SB-14, SB-14B, SB-15, SB-17, SB-19, Method Blank (A5B1524902), Matrix Spike Blank (A5B1524901)
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260

Decachlorobiphenyl
SB-12, SB-13A, SB-13B, SB-14, SB-14B, SB-15, SB-17, SB-19, Method Blank (A5B1524902), Matrix Spike Blank (A5B1524901)
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260

7. **CONTRACT PROBLEMS NON-COMPLIANCE:**
Calibration Verification checks:
Calibration Verification checks were not performed for all Target compounds.

8. **FIELD DOCUMENTATION:** No problems were identified.

9. **OTHER PROBLEMS:** None.

10. **DILUTIONS, RE-EXTRACTIONS & REANALYSIS:**

Samples may be reanalyzed after dilution, re-extraction and for other QC reasons. In such cases, the best result values are consolidated in one single report and the other report is marked as not to be used. The following reports were identified as not to be used

None.

Appendix A: Table 6

Provided below is a list of samples where the analytical data was assessed for usability by EPA's Division of Environmental Science & Assessment in February 2013. Samples were collected by NYSDEC in October 2005 and were analyzed through STL Laboratories in Buffalo, New York. Discussion of these samples can be found in NYSDEC's Remedial Investigation for the Eighteenmile Creek Corridor dated September 2006.

Samples from Table 6 below are associated with either of the following reports:
Job Number: A05B170 Analysis: Metals, Hg (Inorganic)
Job Number: A05B170 Analysis: PCB (Organic)

All samples discussed within either report labeled with "Job Number: A05B170" were validated, but only samples provided in Table 6 below were used in the Baseline Human Health Risk Assessment for Eighteenmile Creek OU1.

Property ID	Sample Locations	Job Number	Inorganic	Organic	Rejected Data	Analysis
H	SB-20	A05B170	x	x		PCBS, Metals, PAHs
I	SB-23	A05B170	x	x		PCBs and Metals

EXECUTIVE NARRATIVE

Case No. : 2005
Site: Eighteen Mile Creek
Number of Samples: 3 soil
Analysis: Metals

Job #: A05-B170
Laboratory: STL Buffalo
Sampling dates: 10/06/05

QAPP
HWSS #: Not available.
Contractor Document #: Not available.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data have been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: None.

Major Findings: Sample SB-20 has analytes qualified "J".

Minor Findings: Pre-digestion spike and laboratory duplicate analyses were not performed for this SDG.

COMMENT: None

Reviewer Name(s): Constantin Stanca

Approver's Signature:

Date: 01/23/2013

Name: Muhammad H. Sheikh

Affiliation: USEPA/R2/HWSB/HWSS

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	Explanation		
	INORGANICS	ORGANICS	CHLORINATED DIOXIN/FURAN
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J–	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		*The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".*	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

DATA ASSESSMENT

ANALYSIS: METALS ICP-AES

The current SOP HW-2a (Revision 15) December 2012, USEPA Region II Data Validation SOP for Statement of Work ISOM01.2 for evaluating metals data has been applied. Data has been reviewed according to TDF specifications, the National Functional Guidelines, and analytical method requirements.

1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time or pH (aqueous samples are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (180 days) or pH ($\leq$2) have not been met, will be qualified as estimated, "J"; the non-detects will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the Inorganic Target Analyte List (TAL). Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be used to establish each analytical curve. At least one of these standards shall be at or below the CRQL. The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The curve must have a correlation coefficient ≥ 0.995. The percent differences calculated for all of the non-zero standards must be within ±30% of the true value of the standard. The y-intercept of the curve must be less than the CRQL. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for each target analyte by the analysis of an ICV solution(s).
The CCV standard shall be analyzed at a frequency of every two hours during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last

analytical sample. The percent recovery acceptable limits for ICV/CCV are 90 – 110%. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

3. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Calibration blanks (ICB and CCB) are used to ensure a stable instrument baseline before and during the analysis of analytical samples. The preparation blank is used to assess the level of contamination introduced to the analytical samples throughout the sample preparation process. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

The following samples have analyte results greater than or equal to IDLs but less than CRQLs. The associated ICB analyte results are greater than or equal to IDLs but less than or equal to CRQLs. Detected analytes are qualified U. Nondetected analytes are not qualified. Sample results are elevated to CRQLs.

Antimony SB-20

The following samples have analyte results greater than or equal to IDLs but less than CRQLs. The associated CCB analyte results are greater than or equal to IDLs but less than or equal to CRQLs. Detected analytes are qualified U. Nondetected analytes are not qualified. Sample results are elevated at CRQLs.

Antimony, Beryllium SB-20

4. **INTERFERENCE CHECK SAMPLE**

The Interference Check Sample (ICS) verifies the analytical instrument's ability to overcome interferences typical of those found in samples. The laboratory should have analyzed and reported ICS results for all elements being reported from the analytical run and for all interferents (target and non-target) for these reported elements. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and Solution AB consists of the analytes mixed with the interferents. Results for the analysis of ICS Solution must fall within the control limits of ± 20% or ±CRQL (whichever is greater) of the true value for the analytes and interferents included in the solution. If results that are ≥ MDL are observed for analytes that are not present in the ICS solution, the possibility of false positives exists. If negative results are observed for analytes that are not present in the ICS solution, and their absolute value is ≥ MDL, the possibility of false negatives in the samples exists. In general, ICP sample data can be accepted if the concentrations of Al, Ca, Fe, and Mg in the sample are found to be less than or equal to their respective concentrations in the ICS. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

5. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However, spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. For a matrix spike analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the matrix spike sample.

Pre-digestion spike analysis was not performed for this SDG. No action was taken.

6. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. A control limit of 20% for the Relative Percent Difference (RPD)

shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. For a duplicate sample analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the duplicate sample.

Laboratory duplicate analysis was not performed for this SDG. No action was taken.

7. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. For field duplicates analysis that does not meet the technical criteria, the action was applied to only the field sample and it's duplicate.

Not applicable.

8. LABORATORY CONTROL SAMPLE

The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Aqueous/water, soil/sediment, wipe, and filter LCSs shall be analyzed for each analyte utilizing the same sample preparations, analytical methods, and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples. All LCS Percent Recoveries (%R) must fall within the control limits of 70-130%, except for Sb and Ag which must fall within the control limits of 50-150%. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

9. ICP SERIAL DILUTION

The serial dilution of samples quantitated by Inductively Coupled Plasma determines whether or not significant physical or chemical interferences exist due to sample matrix. If the analyte concentration is sufficiently high [concentration in the original sample is > 50 times (50x) the Method Detection Limit (MDL)], the Percent Difference (%D) between the original determination

and the serial dilution analysis (a five-fold dilution) after correction for dilution shall be less than 10. For a serial dilution analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the serial dilution sample.

The following ICP-AES Serial Dilution (SD) samples have percent difference (%D) greater than 15% and initial sample results are greater than 50xMDLs. The detected anlaytes in samples with results greater than or equal to MDLs are qualified J. Nondetected analytes are not qualified.

Arsenic SB-20

10. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. All results of a sample with percent solids less than 50% are qualified estimated, "J". Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

ANALYSIS: MERCURY

The current SOP HW-2c (Revision 15) December 2012, USEPA Region II Data Validation SOP for Statement of Work ISOM01.2 for evaluating metals data has been applied. Data has been reviewed according to TDF specifications, the National Functional Guidelines Report, and analytical method requirements.

1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time, pH (aqueous samples), or cooler temperature are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (28 days) and pH ($\leq$2) have not been met, will be qualified as estimated, "J"; the non-detects (sample quantitation limits) will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for mercury. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be employed to establish the analytical curve. At least one of the calibration standards shall be at or below the Contract Required Quantitation Limit (CRQL). The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The calibration curves for mercury shall possess a correlation coefficient of ≥ 0.995 to ensure the linearity over the calibrated range. The percent differences calculated for all of the non-zero standards must fall within ±30% of the true value of the standard. The y-intercept of the curve must be less than the CRQL. All sample results shall be reported from an analysis within the calibrated range. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for mercury by the analysis of an ICV solution(s). The CCV standard shall be analyzed at a frequency of every hour during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last analytical sample. The percent recovery acceptable limits for ICV/CCV are 85 – 115%. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

3. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

4. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However, spike recovery limits do not apply when the sample concentration is ≥ 4x the spike added. For a matrix spike analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the matrix spike sample.

Pre-digestion spike analysis was not performed for this SDG. No action was taken.

5. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or

duplicate value is < 5x the CRQL. For a duplicate sample analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the duplicate sample.

Laboratory duplicate analysis was not performed for this SDG. No action was taken.

6. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values ≥ five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. For field duplicates analysis that does not meet the technical criteria, the action was applied to only the field sample and it's duplicate.

No problems found for this qualification.

7. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. Qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **REGION 2** **DESA/HWSB/HWSS** **2890, Woodbridge Avenue, Edison, NJ 08837**

EXECUTIVE NARRATIVE

CASE No.: 2005
Site: Eighteen Mile Creek.
Number of Samples: 3 (Soil)
Analysis: BNA, PCB

JOB No./SDG No.: A05-B170/SB-20(B170)
Laboratory: STL
Sampling dates: 10/06/05

QAPP
HWSS #: Not applicable.
Contractor Document #: Not applicable.

SUMMARY:

Critical: Results have an unacceptable level of uncertainty and should not be used for making decisions. Data has been qualified "R" rejected.
Major: A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated.
Minor: The level of uncertainty is acceptable. No significant bias in the data was observed.

Critical Findings: None.

Major Findings: BNA- Sample # SB-20 has analytes that have been qualified "J".

Minor Findings: None.

COMMENT:	None

Reviewer Name(s): Shobitha Capil

Approver's Signature: **Date: 01/23/13**

Name: Russell Arnone

Affiliation: USEPA/R2/HWSB/HWSS

Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	Explanation		
	INORGANICS	ORGANICS	CHLORINATED DIOXIN/FURAN
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.		
J−	The result is an estimated quantity, but the result may be biased low.		
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		*The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".*	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	

DATA ASSESSMENT

ANALYSIS: BNA

The current SOP HW-22/SVOA (Revision 4) August 2008, USEPA Hazardous Waste Support Branch Validating Semivolatile Organic Compounds By Gas Chromatography/Mass Spectrometry SW-846 Method 8270D has been applied.

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

No problems found for this qualification.

4. Laboratory Control Samples (LCS):

The LCSs data provides information on the accuracy of the analytical method and laboratory performance. If LCS recoveries fell outside of the acceptable limits, qualifications were applied to the associated samples and compounds as shown below.

The following Laboratory Control Sample has percent spike recovery greater than the upper QC limit. Detected compounds are qualified J.

Pentachlorphenol
Sample # SB-20

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for common contaminants), the analytes are qualified as non-detects,
"U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:
The following semi volatile sample has analyte concentrations reported less than the CRQL. The associated method blank concentration is less than the concentration criteria. Detected compounds are qualified U. Non detected compounds are not qualified. Reported sample concentrations have been elevated to the CRQL.

Bis(2-ethylhexyl)phthalate
Sample # SB-20

B) Field blank contamination:
Not applicable.

6. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene and for semi-volatiles Decafluorotriphenyl-phosphine (DFTPP).

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems found for this qualification.

7. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) and for SPCC compounds must be ≥ 0.05, in both the initial and continuing calibrations. A value < 0.05, indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

No problems found for this qualification.

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 20% for target analytes, <30% for CCC compounds. %D must be < 20% for target analytes and for CCC compounds. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria (>90%), non-detects data may be qualified "R".

The following analytes in the sample shown were qualified for %RSD and %D:

The following semi volatile samples are associated with %RSD & %D outside criteria. Detected compounds are qualified J. Non detected compounds are qualified UJ.

Benzaldehyde, Hexachlorocyclopentadiene, Pentachlorophenol, 4-Nitroanailine & 2,4-Dinitrophenol:
Sample # SB-20, Method Blank (S Blank), Matrix Blank spike

8. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than 30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

No problems found for this qualification.

9. CONTRACT PROBLEMS NON-COMPLIANCE: No problems.

10. FIELD DOCUMENTATION: No problems.

11. OTHER PROBLEMS: None.

12. This package contains re-extracted, re-analyzed or dilution runs. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.

None.

ANALYSIS: PCB

The current SOP HW-45/PCB (Revision 1) October 2006, USEPA Hazardous Waste Support Branch Validating PCB Compounds By Gas Chromatography SW-846 Method 8082A has been applied.

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

No problems found for this qualification.

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

No problems found for this qualification.

4. Laboratory Control Samples (LCS):

The LCSs data provides information on the accuracy of the analytical method and laboratory performance. If LCS recoveries fell outside of the acceptable limits, qualifications were applied to the associated samples and compounds as shown below.

No problems found for this qualification.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Depending on the concentration of the analyte in the blank, the analytes are qualified as non-detects U. The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

No problems found for this qualification.

B) Field blank contamination:

Not applicable.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. 2nd Order Non Linear calibration model is used. The Calibration Verification checks document that the instrument is giving satisfactory daily performance.

A) Correlation coefficient R^2 and Percent Drift (%Drift):

For the initial calibration, if the value of the correlation coefficient R^2 is below 0.99 for any PCB or any surrogate qualify all associated positive results "J" and non-detects "UJ". Qualifiers are applied based on primary column calibration only.

For the Calibration Verification checks, if Percent Drift (%Drift) exceeds 20% for any PCB or any surrogate, qualify all associated positive results “J” and non-detects “UJ”. Qualifiers are applied based on primary column calibration only.

No problems found for this qualification.

7. CONTRACT PROBLEMS NON-COMPLIANCE:

Calibration Verification checks:
Calibration Verification checks were not performed for all Target compounds.

8. FIELD DOCUMENTATION:
No problems were identified.

9. OTHER PROBLEMS:
None.

10. This package contains re-extracted, re-analyzed or dilution runs. Upon reviewing the QA results, the following Form 1(s) are identified NOT to be used.

None.

Appendix A

Tables of Results

SAMPLE ID	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SS-5-M	WATER	7/23/2002	Lead	19.9		ug/L
SS-5-M	SOIL	7/23/2002	Lead	29.8		mg/kg
SS-8	SOIL	7/23/2002	Aroclor-1260	2500	U	ug/kg
SS-8	SOIL	7/23/2002	Aroclor-1254	3500		ug/kg
SS-8	SOIL	7/23/2002	Aroclor-1248	2800		ug/kg
SS-8	SOIL	7/23/2002	Aroclor-1242	2500	U	ug/kg
SS-8	SOIL	7/23/2002	Aroclor 1232	2500	U	ug/kg
SS-8	SOIL	7/23/2002	Aroclor 1016	2500	U	ug/kg
SS-8	SOIL	7/23/2002	Aroclor 1221	2500	U	ug/kg
SS-8-M	SOIL	7/23/2002	Lead	1100		mg/kg
SS-9	SOIL	7/23/2002	Aroclor-1260	2200	U	ug/kg
SS-9	SOIL	7/23/2002	Aroclor-1254	4300		ug/kg
SS-9	SOIL	7/23/2002	Aroclor-1248	3700		ug/kg
SS-9	SOIL	7/23/2002	Aroclor-1242	2200	U	ug/kg
SS-9	SOIL	7/23/2002	Aroclor 1232	2200	U	ug/kg
SS-9	SOIL	7/23/2002	Aroclor 1016	2200	U	ug/kg
SS-9	SOIL	7/23/2002	Aroclor 1221	2200	U	ug/kg
SS-9-M	SOIL	7/23/2002	Lead	1360		mg/kg
SS-10	SOIL	7/23/2002	Aroclor-1260	590	U	ug/kg
SS-10	SOIL	7/23/2002	Aroclor-1254	240	J	ug/kg
SS-10	SOIL	7/23/2002	Aroclor-1248	220	J	ug/kg
SS-10	SOIL	7/23/2002	Aroclor-1242	590	U	ug/kg
SS-10	SOIL	7/23/2002	Aroclor 1232	590	U	ug/kg
SS-10	SOIL	7/23/2002	Aroclor 1016	590	U	ug/kg
SS-10	SOIL	7/23/2002	Aroclor 1221	590	U	ug/kg
SS-10M	SOIL	7/23/2002	Lead	4630		mg/kg
SS-11-M	SOIL	7/23/2002	Lead	913		mg/kg
SS-12-M	SOIL	7/23/2002	Lead	1330		mg/kg
SS-13-M	SOIL	7/23/2002	Lead	140		mg/kg
SS-14-M	SOIL	7/23/2002	Lead	172		mg/kg
SS-15-M	SOIL	7/23/2002	Lead	1110		mg/kg
SS-16-M	SOIL	7/23/2002	Lead	438		mg/kg
SS-17-M	SOIL	7/23/2002	Lead	56.2		mg/kg
SS-18-M	SOIL	7/23/2002	Lead	227		mg/kg
SS-19-M	SOIL	7/23/2002	Lead	549		mg/kg
SS-20-M	SOIL	7/23/2002	Lead	936		mg/kg
SS-21-M	SOIL	7/23/2002	Lead	3680		mg/kg

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SS-25	SOIL	11/1/2005	Aroclor 1016	97	U	UG/KG
SS-25	SOIL	11/1/2005	Aroclor 1221	97	U	UG/KG
SS-25	SOIL	11/1/2005	Aroclor 1232	97	U	UG/KG
SS-25	SOIL	11/1/2005	Aroclor 1242	97	U	UG/KG
SS-25	SOIL	11/1/2005	Aroclor 1248	97	U	UG/KG
SS-25	SOIL	11/1/2005	Aroclor 1254	97	U	UG/KG
SS-25	SOIL	11/1/2005	Aroclor 1260	97	U	UG/KG
SS-25-M	SOIL	11/1/2005	Arsenic - Total	12.3		MG/KG
SS-25-M	SOIL	11/1/2005	Chromium - Total	39.1		MG/KG
SS-25-M	SOIL	11/1/2005	Copper - Total	66.5		MG/KG
SS-25-M	SOIL	11/1/2005	Lead - Total	349		MG/KG
SS-25-M	SOIL	11/1/2005	Zinc - Total	255		MG/KG
SS-26	SOIL	11/1/2005	Aroclor 1016	110	U	UG/KG
SS-26	SOIL	11/1/2005	Aroclor 1221	110	U	UG/KG
SS-26	SOIL	11/1/2005	Aroclor 1232	110	U	UG/KG
SS-26	SOIL	11/1/2005	Aroclor 1242	110	U	UG/KG
SS-26	SOIL	11/1/2005	Aroclor 1248	110	U	UG/KG
SS-26	SOIL	11/1/2005	Aroclor 1254	110	U	UG/KG
SS-26	SOIL	11/1/2005	Aroclor 1260	110	U	UG/KG
SS-26-M	SOIL	11/1/2005	Arsenic - Total	13		MG/KG
SS-26-M	SOIL	11/1/2005	Chromium - Total	12.6		MG/KG
SS-26-M	SOIL	11/1/2005	Copper - Total	59.3		MG/KG
SS-26-M	SOIL	11/1/2005	Lead - Total	254		MG/KG
SS-26-M	SOIL	11/1/2005	Zinc - Total	193		MG/KG
SS-27	SOIL	11/1/2005	Aroclor 1016	120	U	UG/KG
SS-27	SOIL	11/1/2005	Aroclor 1221	120	U	UG/KG
SS-27	SOIL	11/1/2005	Aroclor 1232	120	U	UG/KG
SS-27	SOIL	11/1/2005	Aroclor 1242	120	U	UG/KG
SS-27	SOIL	11/1/2005	Aroclor 1248	120	U	UG/KG
SS-27	SOIL	11/1/2005	Aroclor 1254	120	U	UG/KG
SS-27	SOIL	11/1/2005	Aroclor 1260	120	U	UG/KG
SS-27-M	SOIL	11/1/2005	Arsenic - Total	66.5		MG/KG
SS-27-M	SOIL	11/1/2005	Chromium - Total	15.7		MG/KG
SS-27-M	SOIL	11/1/2005	Copper - Total	54.6		MG/KG
SS-27-M	SOIL	11/1/2005	Lead - Total	214		MG/KG
SS-27-M	SOIL	11/1/2005	Zinc - Total	231		MG/KG
SS-28	SOIL	11/1/2005	Aroclor 1016	100	U	UG/KG
SS-28	SOIL	11/1/2005	Aroclor 1221	100	U	UG/KG
SS-28	SOIL	11/1/2005	Aroclor 1232	100	U	UG/KG
SS-28	SOIL	11/1/2005	Aroclor 1242	100	U	UG/KG
SS-28	SOIL	11/1/2005	Aroclor 1248	100	U	UG/KG
SS-28	SOIL	11/1/2005	Aroclor 1254	100	U	UG/KG
SS-28	SOIL	11/1/2005	Aroclor 1260	100	U	UG/KG
SS-28-M	SOIL	11/1/2005	Arsenic - Total	12.8		MG/KG
SS-28-M	SOIL	11/1/2005	Chromium - Total	14.4		MG/KG
SS-28-M	SOIL	11/1/2005	Copper - Total	107		MG/KG
SS-28-M	SOIL	11/1/2005	Lead - Total	311		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SS-28-M	SOIL	11/1/2005	Zinc - Total	227		MG/KG
SS-29	SOIL	11/1/2005	Aroclor 1016	6300	U	UG/KG
SS-29	SOIL	11/1/2005	Aroclor 1221	6300	U	UG/KG
SS-29	SOIL	11/1/2005	Aroclor 1232	6300	U	UG/KG
SS-29	SOIL	11/1/2005	Aroclor 1242	6300	U	UG/KG
SS-29	SOIL	11/1/2005	Aroclor 1248	14000	J	UG/KG
SS-29	SOIL	11/1/2005	Aroclor 1254	13000		UG/KG
SS-29	SOIL	11/1/2005	Aroclor 1260	6300	U	UG/KG
SS-29-M	SOIL	11/1/2005	Arsenic - Total	7.9		MG/KG
SS-29-M	SOIL	11/1/2005	Chromium - Total	164		MG/KG
SS-29-M	SOIL	11/1/2005	Copper - Total	1010		MG/KG
SS-29-M	SOIL	11/1/2005	Lead - Total	1470		MG/KG
SS-29-M	SOIL	11/1/2005	Zinc - Total	1090		MG/KG
SS-30	SOIL	11/2/2005	Aroclor 1016	130	U	UG/KG
SS-30	SOIL	11/2/2005	Aroclor 1221	130	U	UG/KG
SS-30	SOIL	11/2/2005	Aroclor 1232	130	U	UG/KG
SS-30	SOIL	11/2/2005	Aroclor 1242	130	U	UG/KG
SS-30	SOIL	11/2/2005	Aroclor 1248	130	U	UG/KG
SS-30	SOIL	11/2/2005	Aroclor 1254	180	J	UG/KG
SS-30	SOIL	11/2/2005	Aroclor 1260	130	U	UG/KG
SS-30-M	SOIL	11/2/2005	Arsenic - Total	13.4		MG/KG
SS-30-M	SOIL	11/2/2005	Chromium - Total	25.6		MG/KG
SS-30-M	SOIL	11/2/2005	Copper - Total	244		MG/KG
SS-30-M	SOIL	11/2/2005	Lead - Total	1160		MG/KG
SS-30-M	SOIL	11/2/2005	Zinc - Total	1660		MG/KG
SS-31	SOIL	11/2/2005	Aroclor 1016	110	U	UG/KG
SS-31	SOIL	11/2/2005	Aroclor 1221	110	U	UG/KG
SS-31	SOIL	11/2/2005	Aroclor 1232	110	U	UG/KG
SS-31	SOIL	11/2/2005	Aroclor 1242	110	U	UG/KG
SS-31	SOIL	11/2/2005	Aroclor 1248	110	U	UG/KG
SS-31	SOIL	11/2/2005	Aroclor 1254	73	J	UG/KG
SS-31	SOIL	11/2/2005	Aroclor 1260	110	U	UG/KG
SS-31-M	SOIL	11/2/2005	Arsenic - Total	5.3		MG/KG
SS-31-M	SOIL	11/2/2005	Chromium - Total	14.5		MG/KG
SS-31-M	SOIL	11/2/2005	Copper - Total	32.2		MG/KG
SS-31-M	SOIL	11/2/2005	Lead - Total	101		MG/KG
SS-31-M	SOIL	11/2/2005	Zinc - Total	194		MG/KG
SS-32	SOIL	11/2/2005	Aroclor 1016	110	U	UG/KG
SS-32	SOIL	11/2/2005	Aroclor 1221	110	U	UG/KG
SS-32	SOIL	11/2/2005	Aroclor 1232	110	U	UG/KG
SS-32	SOIL	11/2/2005	Aroclor 1242	110	U	UG/KG
SS-32	SOIL	11/2/2005	Aroclor 1248	110	U	UG/KG
SS-32	SOIL	11/2/2005	Aroclor 1254	100	J	UG/KG
SS-32	SOIL	11/2/2005	Aroclor 1260	110	U	UG/KG
SS-32-M	SOIL	11/2/2005	Arsenic - Total	26.4		MG/KG
SS-32-M	SOIL	11/2/2005	Chromium - Total	16.8		MG/KG
SS-32-M	SOIL	11/2/2005	Copper - Total	59.4		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SS-32-M	SOIL	11/2/2005	Lead - Total	184		MG/KG
SS-32-M	SOIL	11/2/2005	Zinc - Total	227		MG/KG
SS-33	SOIL	11/2/2005	Aroclor 1016	110	U	UG/KG
SS-33	SOIL	11/2/2005	Aroclor 1221	110	U	UG/KG
SS-33	SOIL	11/2/2005	Aroclor 1232	110	U	UG/KG
SS-33	SOIL	11/2/2005	Aroclor 1242	110	U	UG/KG
SS-33	SOIL	11/2/2005	Aroclor 1248	110	U	UG/KG
SS-33	SOIL	11/2/2005	Aroclor 1254	110	U	UG/KG
SS-33	SOIL	11/2/2005	Aroclor 1260	110	U	UG/KG
SS-33-M	SOIL	11/2/2005	Arsenic - Total	11.6		MG/KG
SS-33-M	SOIL	11/2/2005	Chromium - Total	13.1		MG/KG
SS-33-M	SOIL	11/2/2005	Copper - Total	51.2		MG/KG
SS-33-M	SOIL	11/2/2005	Lead - Total	226		MG/KG
SS-33-M	SOIL	11/2/2005	Zinc - Total	485		MG/KG
SS-34	SOIL	11/2/2005	Aroclor 1016	110	U	UG/KG
SS-34	SOIL	11/2/2005	Aroclor 1221	110	U	UG/KG
SS-34	SOIL	11/2/2005	Aroclor 1232	110	U	UG/KG
SS-34	SOIL	11/2/2005	Aroclor 1242	110	U	UG/KG
SS-34	SOIL	11/2/2005	Aroclor 1248	110	U	UG/KG
SS-34	SOIL	11/2/2005	Aroclor 1254	260	J	UG/KG
SS-34	SOIL	11/2/2005	Aroclor 1260	110	U	UG/KG
SS-34-M	SOIL	11/2/2005	Arsenic - Total	13	J	MG/KG
SS-34-M	SOIL	11/2/2005	Chromium - Total	18	J	MG/KG
SS-34-M	SOIL	11/2/2005	Copper - Total	112	J	MG/KG
SS-34-M	SOIL	11/2/2005	Lead - Total	342	J	MG/KG
SS-34-M	SOIL	11/2/2005	Zinc - Total	581	J	MG/KG
SS-35	SOIL	11/2/2005	Aroclor 1016	100	U	UG/KG
SS-35	SOIL	11/2/2005	Aroclor 1221	100	U	UG/KG
SS-35	SOIL	11/2/2005	Aroclor 1232	100	U	UG/KG
SS-35	SOIL	11/2/2005	Aroclor 1242	100	U	UG/KG
SS-35	SOIL	11/2/2005	Aroclor 1248	100	U	UG/KG
SS-35	SOIL	11/2/2005	Aroclor 1254	150		UG/KG
SS-35	SOIL	11/2/2005	Aroclor 1260	100	U	UG/KG
SS-35-M	SOIL	11/2/2005	Arsenic - Total	12.2		MG/KG
SS-35-M	SOIL	11/2/2005	Chromium - Total	15.1		MG/KG
SS-35-M	SOIL	11/2/2005	Copper - Total	164		MG/KG
SS-35-M	SOIL	11/2/2005	Lead - Total	387		MG/KG
SS-35-M	SOIL	11/2/2005	Zinc - Total	431		MG/KG
SS-36	SOIL	11/2/2005	Aroclor 1016	120	U	UG/KG
SS-36	SOIL	11/2/2005	Aroclor 1221	120	U	UG/KG
SS-36	SOIL	11/2/2005	Aroclor 1232	120	U	UG/KG
SS-36	SOIL	11/2/2005	Aroclor 1242	120	U	UG/KG
SS-36	SOIL	11/2/2005	Aroclor 1248	120	U	UG/KG
SS-36	SOIL	11/2/2005	Aroclor 1254	70	J	UG/KG
SS-36	SOIL	11/2/2005	Aroclor 1260	120	U	UG/KG
SS-36-M	SOIL	11/2/2005	Arsenic - Total	15.5		MG/KG
SS-36-M	SOIL	11/2/2005	Chromium - Total	20.5		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SS-36-M	SOIL	11/2/2005	Copper - Total	108		MG/KG
SS-36-M	SOIL	11/2/2005	Lead - Total	603		MG/KG
SS-36-M	SOIL	11/2/2005	Zinc - Total	500		MG/KG
SS-37	SOIL	11/2/2005	Aroclor 1016	120	U	UG/KG
SS-37	SOIL	11/2/2005	Aroclor 1221	120	U	UG/KG
SS-37	SOIL	11/2/2005	Aroclor 1232	120	U	UG/KG
SS-37	SOIL	11/2/2005	Aroclor 1242	120	U	UG/KG
SS-37	SOIL	11/2/2005	Aroclor 1248	120	U	UG/KG
SS-37	SOIL	11/2/2005	Aroclor 1254	700	J	UG/KG
SS-37	SOIL	11/2/2005	Aroclor 1260	360	J	UG/KG
SS-37-M	SOIL	11/2/2005	Arsenic - Total	8.1		MG/KG
SS-37-M	SOIL	11/2/2005	Chromium - Total	22.6		MG/KG
SS-37-M	SOIL	11/2/2005	Copper - Total	210		MG/KG
SS-37-M	SOIL	11/2/2005	Lead - Total	666		MG/KG
SS-37-M	SOIL	11/2/2005	Zinc - Total	1330		MG/KG
SS-38	SOIL	11/2/2005	Aroclor 1016	100	U	UG/KG
SS-38	SOIL	11/2/2005	Aroclor 1221	100	U	UG/KG
SS-38	SOIL	11/2/2005	Aroclor 1232	100	U	UG/KG
SS-38	SOIL	11/2/2005	Aroclor 1242	100	U	UG/KG
SS-38	SOIL	11/2/2005	Aroclor 1248	100	U	UG/KG
SS-38	SOIL	11/2/2005	Aroclor 1254	100	U	UG/KG
SS-38	SOIL	11/2/2005	Aroclor 1260	68	J	UG/KG
SS-38-M	SOIL	11/2/2005	Arsenic - Total	7.7		MG/KG
SS-38-M	SOIL	11/2/2005	Chromium - Total	16.2		MG/KG
SS-38-M	SOIL	11/2/2005	Copper - Total	97.2		MG/KG
SS-38-M	SOIL	11/2/2005	Lead - Total	901		MG/KG
SS-38-M	SOIL	11/2/2005	Zinc - Total	591		MG/KG
SS-39	SOIL	11/3/2005	Aroclor 1016	140	UJ	UG/KG
SS-39	SOIL	11/3/2005	Aroclor 1221	140	UJ	UG/KG
SS-39	SOIL	11/3/2005	Aroclor 1232	140	UJ	UG/KG
SS-39	SOIL	11/3/2005	Aroclor 1242	140	UJ	UG/KG
SS-39	SOIL	11/3/2005	Aroclor 1248	56	J	UG/KG
SS-39	SOIL	11/3/2005	Aroclor 1254	120	J	UG/KG
SS-39	SOIL	11/3/2005	Aroclor 1260	140	UJ	UG/KG
SS-39-M	SOIL	11/3/2005	Arsenic - Total	14.8		MG/KG
SS-39-M	SOIL	11/3/2005	Chromium - Total	19.4		MG/KG
SS-39-M	SOIL	11/3/2005	Copper - Total	132		MG/KG
SS-39-M	SOIL	11/3/2005	Lead - Total	662		MG/KG
SS-39-M	SOIL	11/3/2005	Zinc - Total	255		MG/KG
SS-40	SOIL	11/3/2005	Aroclor 1016	130	U	UG/KG
SS-40	SOIL	11/3/2005	Aroclor 1221	130	U	UG/KG
SS-40	SOIL	11/3/2005	Aroclor 1232	130	U	UG/KG
SS-40	SOIL	11/3/2005	Aroclor 1242	130	U	UG/KG
SS-40	SOIL	11/3/2005	Aroclor 1248	130	U	UG/KG
SS-40	SOIL	11/3/2005	Aroclor 1254	80	J	UG/KG
SS-40	SOIL	11/3/2005	Aroclor 1260	130	U	UG/KG
SS-40-M	SOIL	11/3/2005	Arsenic - Total	5.8		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SS-40-M	SOIL	11/3/2005	Chromium - Total	10.7		MG/KG
SS-40-M	SOIL	11/3/2005	Copper - Total	37.1		MG/KG
SS-40-M	SOIL	11/3/2005	Lead - Total	158		MG/KG
SS-40-M	SOIL	11/3/2005	Zinc - Total	146		MG/KG
SS-41	SOIL	11/3/2005	Aroclor 1016	120	U	UG/KG
SS-41	SOIL	11/3/2005	Aroclor 1221	120	U	UG/KG
SS-41	SOIL	11/3/2005	Aroclor 1232	120	U	UG/KG
SS-41	SOIL	11/3/2005	Aroclor 1242	120	U	UG/KG
SS-41	SOIL	11/3/2005	Aroclor 1248	120	U	UG/KG
SS-41	SOIL	11/3/2005	Aroclor 1254	120	U	UG/KG
SS-41	SOIL	11/3/2005	Aroclor 1260	92	J	UG/KG
SS-41-M	SOIL	11/3/2005	Arsenic - Total	29.3		MG/KG
SS-41-M	SOIL	11/3/2005	Chromium - Total	30.6		MG/KG
SS-41-M	SOIL	11/3/2005	Copper - Total	162		MG/KG
SS-41-M	SOIL	11/3/2005	Lead - Total	1420		MG/KG
SS-41-M	SOIL	11/3/2005	Zinc - Total	1300		MG/KG
SS-42	SOIL	11/3/2005	Aroclor 1016	120	U	UG/KG
SS-42	SOIL	11/3/2005	Aroclor 1221	120	U	UG/KG
SS-42	SOIL	11/3/2005	Aroclor 1232	120	U	UG/KG
SS-42	SOIL	11/3/2005	Aroclor 1242	120	U	UG/KG
SS-42	SOIL	11/3/2005	Aroclor 1248	120	U	UG/KG
SS-42	SOIL	11/3/2005	Aroclor 1254	120	U	UG/KG
SS-42	SOIL	11/3/2005	Aroclor 1260	120	U	UG/KG
SS-42-M	SOIL	11/3/2005	Arsenic - Total	30.4		MG/KG
SS-42-M	SOIL	11/3/2005	Chromium - Total	21.5		MG/KG
SS-42-M	SOIL	11/3/2005	Copper - Total	128		MG/KG
SS-42-M	SOIL	11/3/2005	Lead - Total	653		MG/KG
SS-42-M	SOIL	11/3/2005	Zinc - Total	422		MG/KG
SS-43	SOIL	11/3/2005	Aroclor 1016	200	UJ	UG/KG
SS-43	SOIL	11/3/2005	Aroclor 1221	200	UJ	UG/KG
SS-43	SOIL	11/3/2005	Aroclor 1232	200	UJ	UG/KG
SS-43	SOIL	11/3/2005	Aroclor 1242	200	UJ	UG/KG
SS-43	SOIL	11/3/2005	Aroclor 1248	66	J	UG/KG
SS-43	SOIL	11/3/2005	Aroclor 1254	200	UJ	UG/KG
SS-43	SOIL	11/3/2005	Aroclor 1260	200	J	UG/KG
SS-43-M	SOIL	11/3/2005	Arsenic - Total	9.4	J	MG/KG
SS-43-M	SOIL	11/3/2005	Chromium - Total	14.5	J	MG/KG
SS-43-M	SOIL	11/3/2005	Copper - Total	78.5	J	MG/KG
SS-43-M	SOIL	11/3/2005	Lead - Total	380	J	MG/KG
SS-43-M	SOIL	11/3/2005	Zinc - Total	292	J	MG/KG
SS-44	SOIL	11/3/2005	Aroclor 1016	170	UJ	UG/KG
SS-44	SOIL	11/3/2005	Aroclor 1221	170	UJ	UG/KG
SS-44	SOIL	11/3/2005	Aroclor 1232	170	UJ	UG/KG
SS-44	SOIL	11/3/2005	Aroclor 1242	170	UJ	UG/KG
SS-44	SOIL	11/3/2005	Aroclor 1248	170	UJ	UG/KG
SS-44	SOIL	11/3/2005	Aroclor 1254	400	J	UG/KG
SS-44	SOIL	11/3/2005	Aroclor 1260	340	J	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SS-44-M	SOIL	11/3/2005	Arsenic - Total	15.4	J	MG/KG
SS-44-M	SOIL	11/3/2005	Chromium - Total	25.6	J	MG/KG
SS-44-M	SOIL	11/3/2005	Copper - Total	202	J	MG/KG
SS-44-M	SOIL	11/3/2005	Lead - Total	344	J	MG/KG
SS-44-M	SOIL	11/3/2005	Zinc - Total	1020	J	MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-10	SOIL	9/27/2005	Aroclor 1260	110	UJ	UG/KG
SB-10	SOIL	9/27/2005	Aroclor 1254	160	J	UG/KG
SB-10	SOIL	9/27/2005	Aroclor 1221	110	UJ	UG/KG
SB-10	SOIL	9/27/2005	Aroclor 1232	110	UJ	UG/KG
SB-10	SOIL	9/27/2005	Aroclor 1248	110	UJ	UG/KG
SB-10	SOIL	9/27/2005	Aroclor 1016	110	UJ	UG/KG
SB-10	SOIL	9/27/2005	Aroclor 1242	110	UJ	UG/KG
SB-10 - M	SOIL	9/27/2005	Arsenic - Total	12.1		MG/KG
SB-10 - M	SOIL	9/27/2005	Chromium - Total	262		MG/KG
SB-10 - M	SOIL	9/27/2005	Copper - Total	234		MG/KG
SB-10 - M	SOIL	9/27/2005	Lead - Total	898		MG/KG
SB-10 - M	SOIL	9/27/2005	Zinc - Total	2240		MG/KG
SB-11	SOIL	9/27/2005	Aroclor 1260	100	UJ	UG/KG
SB-11	SOIL	9/27/2005	Aroclor 1254	100	UJ	UG/KG
SB-11	SOIL	9/27/2005	Aroclor 1221	100	UJ	UG/KG
SB-11	SOIL	9/27/2005	Aroclor 1232	100	UJ	UG/KG
SB-11	SOIL	9/27/2005	Aroclor 1248	100	UJ	UG/KG
SB-11	SOIL	9/27/2005	Aroclor 1016	100	UJ	UG/KG
SB-11	SOIL	9/27/2005	Aroclor 1242	100	UJ	UG/KG
SB-11 - M	SOIL	9/27/2005	Arsenic - Total	22.3		MG/KG
SB-11 - M	SOIL	9/27/2005	Chromium - Total	22.3		MG/KG
SB-11 - M	SOIL	9/27/2005	Copper - Total	2240		MG/KG
SB-11 - M	SOIL	9/27/2005	Lead - Total	1030		MG/KG
SB-11 - M	SOIL	9/27/2005	Zinc - Total	681		MG/KG
SB-4	SOIL	9/27/2005	Aroclor 1260	100	U	UG/KG
SB-4	SOIL	9/27/2005	Aroclor 1254	100	U	UG/KG
SB-4	SOIL	9/27/2005	Aroclor 1221	100	U	UG/KG
SB-4	SOIL	9/27/2005	Aroclor 1232	100	U	UG/KG
SB-4	SOIL	9/27/2005	Aroclor 1248	100	U	UG/KG
SB-4	SOIL	9/27/2005	Aroclor 1016	100	U	UG/KG
SB-4	SOIL	9/27/2005	Aroclor 1242	100	U	UG/KG
SB-4 - M	SOIL	9/27/2005	Arsenic - Total	23.4		MG/KG
SB-4 - M	SOIL	9/27/2005	Chromium - Total	16.4		MG/KG
SB-4 - M	SOIL	9/27/2005	Copper - Total	370		MG/KG
SB-4 - M	SOIL	9/27/2005	Lead - Total	757		MG/KG
SB-4 - M	SOIL	9/27/2005	Zinc - Total	246		MG/KG
SB-5	SOIL	9/27/2005	Aroclor 1260	100	U	UG/KG
SB-5	SOIL	9/27/2005	Aroclor 1254	100	U	UG/KG
SB-5	SOIL	9/27/2005	Aroclor 1221	100	U	UG/KG
SB-5	SOIL	9/27/2005	Aroclor 1232	100	U	UG/KG
SB-5	SOIL	9/27/2005	Aroclor 1248	100	U	UG/KG
SB-5	SOIL	9/27/2005	Aroclor 1016	100	U	UG/KG
SB-5	SOIL	9/27/2005	Aroclor 1242	100	U	UG/KG
SB-5 - M	SOIL	9/27/2005	Arsenic - Total	24		MG/KG
SB-5 - M	SOIL	9/27/2005	Chromium - Total	27.3		MG/KG
SB-5 - M	SOIL	9/27/2005	Copper - Total	125		MG/KG
SB-5 - M	SOIL	9/27/2005	Lead - Total	888		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-5 - M	SOIL	9/27/2005	Zinc - Total	424		MG/KG
SB-7	SOIL	9/27/2005	Aroclor 1260	110	U	UG/KG
SB-7	SOIL	9/27/2005	Aroclor 1254	110	U	UG/KG
SB-7	SOIL	9/27/2005	Aroclor 1221	110	U	UG/KG
SB-7	SOIL	9/27/2005	Aroclor 1232	110	U	UG/KG
SB-7	SOIL	9/27/2005	Aroclor 1248	110	U	UG/KG
SB-7	SOIL	9/27/2005	Aroclor 1016	110	U	UG/KG
SB-7	SOIL	9/27/2005	Aroclor 1242	110	U	UG/KG
SB-7 - M	SOIL	9/27/2005	Arsenic - Total	15		MG/KG
SB-7 - M	SOIL	9/27/2005	Chromium - Total	23.1		MG/KG
SB-7 - M	SOIL	9/27/2005	Copper - Total	155	J	MG/KG
SB-7 - M	SOIL	9/27/2005	Lead - Total	587		MG/KG
SB-7 - M	SOIL	9/27/2005	Zinc - Total	580		MG/KG
SB-9 - A	SOIL	9/27/2005	Aroclor 1260	110	UJ	UG/KG
SB-9 - A	SOIL	9/27/2005	Aroclor 1254	110	UJ	UG/KG
SB-9 - A	SOIL	9/27/2005	Aroclor 1221	110	UJ	UG/KG
SB-9 - A	SOIL	9/27/2005	Aroclor 1232	110	UJ	UG/KG
SB-9 - A	SOIL	9/27/2005	Aroclor 1248	110	UJ	UG/KG
SB-9 - A	SOIL	9/27/2005	Aroclor 1016	110	UJ	UG/KG
SB-9 - A	SOIL	9/27/2005	Aroclor 1242	110	UJ	UG/KG
SB-9	SOIL	9/27/2005	4-Nitroaniline	11000	U	UG/KG
SB-9	SOIL	9/27/2005	4-Nitrophenol	11000	U	UG/KG
SB-9	SOIL	9/27/2005	Benzaldehyde	4600	U	UG/KG
SB-9	SOIL	9/27/2005	4-Bromophenyl phenyl ether	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Caprolactam	4600	UJ	UG/KG
SB-9	SOIL	9/27/2005	2,4-Dimethylphenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	4-Methylphenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	4-Chloroaniline	4600	U	UG/KG
SB-9	SOIL	9/27/2005	2,2'-Oxybis(1-Chloropropane)	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Phenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Bis(2-chloroethyl) ether	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Bis(2-chloroethoxy) methane	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Bis(2-ethylhexyl) phthalate	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Di-n-octyl phthalate	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Hexachlorobenzene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Anthracene	230	J	UG/KG
SB-9	SOIL	9/27/2005	2,4-Dichlorophenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	2,4-Dinitrotoluene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Pyrene	2000	J	UG/KG
SB-9	SOIL	9/27/2005	Dimethyl phthalate	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Dibenzofuran	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Benzo(ghi)perylene	900	J	UG/KG
SB-9	SOIL	9/27/2005	Atrazine	4600	U	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-9	SOIL	9/27/2005	Indeno(1,2,3-cd)pyrene	730	J	UG/KG
SB-9	SOIL	9/27/2005	Benzo(b)fluoranthene	1300	J	UG/KG
SB-9	SOIL	9/27/2005	Fluoranthene	1900	J	UG/KG
SB-9	SOIL	9/27/2005	Benzo(k)fluoranthene	480	J	UG/KG
SB-9	SOIL	9/27/2005	Acenaphthylene	160	J	UG/KG
SB-9	SOIL	9/27/2005	Chrysene	1200	J	UG/KG
SB-9	SOIL	9/27/2005	Benzo(a)pyrene	1100	J	UG/KG
SB-9	SOIL	9/27/2005	2,4-Dinitrophenol	11000	U	UG/KG
SB-9	SOIL	9/27/2005	Dibenzo(a,h)anthracene	290	J	UG/KG
SB-9	SOIL	9/27/2005	4,6-Dinitro-2-methylphenol	11000	U	UG/KG
SB-9	SOIL	9/27/2005	Benzo(a)anthracene	1100	J	UG/KG
SB-9	SOIL	9/27/2005	4-Chloro-3-methylphenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	2,6-Dinitrotoluene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	N-Nitroso-Di-n-propylamine	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Hexachloroethane	4600	U	UG/KG
SB-9	SOIL	9/27/2005	4-Chlorophenyl phenyl ether	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Hexachlorocyclopentadiene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Isophorone	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Acenaphthene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Diethyl phthalate	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Di-n-butyl phthalate	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Phenanthrene	1200	J	UG/KG
SB-9	SOIL	9/27/2005	Butyl benzyl phthalate	4600	U	UG/KG
SB-9	SOIL	9/27/2005	N-nitrosodiphenylamine	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Fluorene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Carbazole	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Hexachlorobutadiene	4600	UJ	UG/KG
SB-9	SOIL	9/27/2005	Pentachlorophenol	11000	U	UG/KG
SB-9	SOIL	9/27/2005	2,4,6-Trichlorophenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	2-Nitroaniline	11000	U	UG/KG
SB-9	SOIL	9/27/2005	2-Nitrophenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Naphthalene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	2-Methylnaphthalene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	2-Chloronaphthalene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	3,3'-Dichlorobenzidine	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Biphenyl	4600	U	UG/KG
SB-9	SOIL	9/27/2005	2-Methylphenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	2-Chlorophenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	2,4,5-Trichlorophenol	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Acetophenone	4600	U	UG/KG
SB-9	SOIL	9/27/2005	Nitrobenzene	4600	U	UG/KG
SB-9	SOIL	9/27/2005	3-Nitroaniline	11000	U	UG/KG
SB-9 - M	SOIL	9/27/2005	Aluminum - Total	9460		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-9 - M	SOIL	9/27/2005	Antimony - Total	2	B	MG/KG
SB-9 - M	SOIL	9/27/2005	Arsenic - Total	14.4		MG/KG
SB-9 - M	SOIL	9/27/2005	Barium - Total	309		MG/KG
SB-9 - M	SOIL	9/27/2005	Beryllium - Total	0.73	U	MG/KG
SB-9 - M	SOIL	9/27/2005	Cadmium - Total	0.69	B	MG/KG
SB-9 - M	SOIL	9/27/2005	Calcium - Total	25200		MG/KG
SB-9 - M	SOIL	9/27/2005	Chromium - Total	25		MG/KG
SB-9 - M	SOIL	9/27/2005	Cobalt - Total	8.3		MG/KG
SB-9 - M	SOIL	9/27/2005	Copper - Total	125		MG/KG
SB-9 - M	SOIL	9/27/2005	Iron - Total	19400		MG/KG
SB-9 - M	SOIL	9/27/2005	Lead - Total	975		MG/KG
SB-9 - M	SOIL	9/27/2005	Magnesium - Total	5320		MG/KG
SB-9 - M	SOIL	9/27/2005	Manganese - Total	369		MG/KG
SB-9 - M	SOIL	9/27/2005	Mercury - Total	0.793		MG/KG
SB-9 - M	SOIL	9/27/2005	Nickel - Total	22.4		MG/KG
SB-9 - M	SOIL	9/27/2005	Potassium - Total	1320		MG/KG
SB-9 - M	SOIL	9/27/2005	Selenium - Total	2	B	MG/KG
SB-9 - M	SOIL	9/27/2005	Silver - Total	0.56	B	MG/KG
SB-9 - M	SOIL	9/27/2005	Sodium - Total	729	U	MG/KG
SB-9 - M	SOIL	9/27/2005	Thallium - Total	0.68	U	MG/KG
SB-9 - M	SOIL	9/27/2005	Vanadium - Total	27.6		MG/KG
SB-9 - M	SOIL	9/27/2005	Zinc - Total	635		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-12	SOIL	10/3/2005	Aroclor 1260	24	J	UG/KG
SB-12	SOIL	10/3/2005	Aroclor 1254	15	J	UG/KG
SB-12	SOIL	10/3/2005	Aroclor 1221	100	UJ	UG/KG
SB-12	SOIL	10/3/2005	Aroclor 1232	100	UJ	UG/KG
SB-12	SOIL	10/3/2005	Aroclor 1248	100	UJ	UG/KG
SB-12	SOIL	10/3/2005	Aroclor 1016	100	UJ	UG/KG
SB-12	SOIL	10/3/2005	Aroclor 1242	100	UJ	UG/KG
SB-12 - M	SOIL	10/3/2005	Arsenic - Total	14.1		MG/KG
SB-12 - M	SOIL	10/3/2005	Chromium - Total	16.3		MG/KG
SB-12 - M	SOIL	10/3/2005	Copper - Total	74.8		MG/KG
SB-12 - M	SOIL	10/3/2005	Lead - Total	334		MG/KG
SB-12 - M	SOIL	10/3/2005	Zinc - Total	293		MG/KG
SB-13A	SOIL	10/3/2005	Aroclor 1260	41	J	UG/KG
SB-13A	SOIL	10/3/2005	Aroclor 1254	110	J	UG/KG
SB-13A	SOIL	10/3/2005	Aroclor 1221	100	UJ	UG/KG
SB-13A	SOIL	10/3/2005	Aroclor 1232	100	UJ	UG/KG
SB-13A	SOIL	10/3/2005	Aroclor 1248	44	J	UG/KG
SB-13A	SOIL	10/3/2005	Aroclor 1016	100	UJ	UG/KG
SB-13A	SOIL	10/3/2005	Aroclor 1242	100	UJ	UG/KG
SB-13A - M	SOIL	10/3/2005	Arsenic - Total	5.3		MG/KG
SB-13A - M	SOIL	10/3/2005	Chromium - Total	7.7		MG/KG
SB-13A - M	SOIL	10/3/2005	Copper - Total	20.7		MG/KG
SB-13A - M	SOIL	10/3/2005	Lead - Total	71.0		MG/KG
SB-13A - M	SOIL	10/3/2005	Zinc - Total	225		MG/KG
SB-13B - A	SOIL	10/3/2005	Aroclor 1260	860	J	UG/KG
SB-13B - A	SOIL	10/3/2005	Aroclor 1254	1700	J	UG/KG
SB-13B - A	SOIL	10/3/2005	Aroclor 1221	740	UJ	UG/KG
SB-13B - A	SOIL	10/3/2005	Aroclor 1232	740	UJ	UG/KG
SB-13B - A	SOIL	10/3/2005	Aroclor 1248	1600	J	UG/KG
SB-13B - A	SOIL	10/3/2005	Aroclor 1016	740	UJ	UG/KG
SB-13B - A	SOIL	10/3/2005	Aroclor 1242	740	UJ	UG/KG
SB-13B	SOIL	10/3/2005	4-Nitroaniline	30000	UJ	UG/KG
SB-13B	SOIL	10/3/2005	4-Nitrophenol	30000	U	UG/KG
SB-13B	SOIL	10/3/2005	Benzaldehyde	12000	UJ	UG/KG
SB-13B	SOIL	10/3/2005	4-Bromophenyl phenyl ether	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Caprolactam	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2,4-Dimethylphenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	4-Methylphenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	4-Chloroaniline	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2,2'-Oxybis(1-Chloropropane)	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Phenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Bis(2-chloroethyl) ether	12000	U	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-13B	SOIL	10/3/2005	Bis(2-chloroethoxy) methane	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Bis(2-ethylhexyl) phthalate	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Di-n-octyl phthalate	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Hexachlorobenzene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Anthracene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2,4-Dichlorophenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2,4-Dinitrotoluene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Pyrene	1300	J	UG/KG
SB-13B	SOIL	10/3/2005	Dimethyl phthalate	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Dibenzofuran	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Benzo(ghi)perylene	720	J	UG/KG
SB-13B	SOIL	10/3/2005	Atrazine	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Indeno(1,2,3-cd)pyrene	540	J	UG/KG
SB-13B	SOIL	10/3/2005	Benzo(b)fluoranthene	990	J	UG/KG
SB-13B	SOIL	10/3/2005	Fluoranthene	1600	J	UG/KG
SB-13B	SOIL	10/3/2005	Benzo(k)fluoranthene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Acenaphthylene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Chrysene	830	J	UG/KG
SB-13B	SOIL	10/3/2005	Benzo(a)pyrene	860	J	UG/KG
SB-13B	SOIL	10/3/2005	2,4-Dinitrophenol	30000	UJ	UG/KG
SB-13B	SOIL	10/3/2005	Dibenzo(a,h)anthracene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	4,6-Dinitro-2-methylphenol	30000	U	UG/KG
SB-13B	SOIL	10/3/2005	Benzo(a)anthracene	870	J	UG/KG
SB-13B	SOIL	10/3/2005	4-Chloro-3-methylphenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2,6-Dinitrotoluene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	N-Nitroso-Di-n-propylamine	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Hexachloroethane	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	4-Chlorophenyl phenyl ether	12000	U	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-13B	SOIL	10/3/2005	Hexachlorocyclopentadiene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Isophorone	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Acenaphthene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Diethyl phthalate	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Di-n-butyl phthalate	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Phenanthrene	830	J	UG/KG
SB-13B	SOIL	10/3/2005	Butyl benzyl phthalate	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	N-nitrosodiphenylamine	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Fluorene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Carbazole	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Hexachlorobutadiene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Pentachlorophenol	30000	UJ	UG/KG
SB-13B	SOIL	10/3/2005	2,4,6-Trichlorophenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2-Nitroaniline	30000	U	UG/KG
SB-13B	SOIL	10/3/2005	2-Nitrophenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Naphthalene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2-Methylnaphthalene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2-Chloronaphthalene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	3,3'-Dichlorobenzidine	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Biphenyl	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2-Methylphenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2-Chlorophenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	2,4,5-Trichlorophenol	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Acetophenone	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	Nitrobenzene	12000	U	UG/KG
SB-13B	SOIL	10/3/2005	3-Nitroaniline	30000	U	UG/KG
SB-13B - M	SOIL	10/3/2005	Aluminum - Total	11400		MG/KG
SB-13B - M	SOIL	10/3/2005	Antimony - Total	2.1	B	MG/KG
SB-13B - M	SOIL	10/3/2005	Arsenic - Total	20.8		MG/KG
SB-13B - M	SOIL	10/3/2005	Barium - Total	163		MG/KG
SB-13B - M	SOIL	10/3/2005	Beryllium - Total	1.8	U	MG/KG
SB-13B - M	SOIL	10/3/2005	Cadmium - Total	7.9		MG/KG
SB-13B - M	SOIL	10/3/2005	Calcium - Total	8290		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-13B - M	SOIL	10/3/2005	Chromium - Total	157		MG/KG
SB-13B - M	SOIL	10/3/2005	Cobalt - Total	19		MG/KG
SB-13B - M	SOIL	10/3/2005	Copper - Total	603		MG/KG
SB-13B - M	SOIL	10/3/2005	Iron - Total	103000		MG/KG
SB-13B - M	SOIL	10/3/2005	Lead - Total	672		MG/KG
SB-13B - M	SOIL	10/3/2005	Magnesium - Total	4770		MG/KG
SB-13B - M	SOIL	10/3/2005	Manganese - Total	522		MG/KG
SB-13B - M	SOIL	10/3/2005	Mercury - Total	1.9		MG/KG
SB-13B - M	SOIL	10/3/2005	Nickel - Total	76.8		MG/KG
SB-13B - M	SOIL	10/3/2005	Potassium - Total	1470		MG/KG
SB-13B - M	SOIL	10/3/2005	Selenium - Total	6.9		MG/KG
SB-13B - M	SOIL	10/3/2005	Silver - Total	2.9		MG/KG
SB-13B - M	SOIL	10/3/2005	Sodium - Total	323	B	MG/KG
SB-13B - M	SOIL	10/3/2005	Thallium - Total	2.1		MG/KG
SB-13B - M	SOIL	10/3/2005	Vanadium - Total	21.6		MG/KG
SB-13B - M	SOIL	10/3/2005	Zinc - Total	2140		MG/KG
SB-13C	SOIL	10/3/2005	Aroclor 1260	110	J	UG/KG
SB-13C	SOIL	10/3/2005	Aroclor 1254	250	J	UG/KG
SB-13C	SOIL	10/3/2005	Aroclor 1221	110	U	UG/KG
SB-13C	SOIL	10/3/2005	Aroclor 1232	110	U	UG/KG
SB-13C	SOIL	10/3/2005	Aroclor 1248	290	J	UG/KG
SB-13C	SOIL	10/3/2005	Aroclor 1016	110	U	UG/KG
SB-13C	SOIL	10/3/2005	Aroclor 1242	110	U	UG/KG
SB-13C - M	SOIL	10/3/2005	Arsenic - Total	5.3		MG/KG
SB-13C - M	SOIL	10/3/2005	Chromium - Total	34.3		MG/KG
SB-13C - M	SOIL	10/3/2005	Copper - Total	167		MG/KG
SB-13C - M	SOIL	10/3/2005	Lead - Total	319		MG/KG
SB-13C - M	SOIL	10/3/2005	Zinc - Total	2560		MG/KG
SB-14	SOIL	10/3/2005	Aroclor 1260	44	J	UG/KG
SB-14	SOIL	10/3/2005	Aroclor 1254	120	UJ	UG/KG
SB-14	SOIL	10/3/2005	Aroclor 1221	120	UJ	UG/KG
SB-14	SOIL	10/3/2005	Aroclor 1232	120	UJ	UG/KG
SB-14	SOIL	10/3/2005	Aroclor 1248	120	UJ	UG/KG
SB-14	SOIL	10/3/2005	Aroclor 1016	120	UJ	UG/KG
SB-14	SOIL	10/3/2005	Aroclor 1242	120	UJ	UG/KG
SB-14 - M	SOIL	10/3/2005	Arsenic - Total	5.0		MG/KG
SB-14 - M	SOIL	10/3/2005	Chromium - Total	13.7		MG/KG
SB-14 - M	SOIL	10/3/2005	Copper - Total	85.6		MG/KG
SB-14 - M	SOIL	10/3/2005	Lead - Total	200		MG/KG
SB-14 - M	SOIL	10/3/2005	Zinc - Total	471		MG/KG
SB-14B	SOIL	10/3/2005	Aroclor 1260	150	UJ	UG/KG
SB-14B	SOIL	10/3/2005	Aroclor 1254	150	UJ	UG/KG
SB-14B	SOIL	10/3/2005	Aroclor 1221	150	UJ	UG/KG
SB-14B	SOIL	10/3/2005	Aroclor 1232	150	UJ	UG/KG
SB-14B	SOIL	10/3/2005	Aroclor 1248	150	UJ	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-14B	SOIL	10/3/2005	Aroclor 1016	150	UJ	UG/KG
SB-14B	SOIL	10/3/2005	Aroclor 1242	150	UJ	UG/KG
SB-14B - M	SOIL	10/3/2005	Arsenic - Total	9.4		MG/KG
SB-14B - M	SOIL	10/3/2005	Chromium - Total	20.3		MG/KG
SB-14B - M	SOIL	10/3/2005	Copper - Total	99.7		MG/KG
SB-14B - M	SOIL	10/3/2005	Lead - Total	245		MG/KG
SB-14B - M	SOIL	10/3/2005	Zinc - Total	254		MG/KG
SB-15 - A	SOIL	10/3/2005	Aroclor 1260	32	J	UG/KG
SB-15 - A	SOIL	10/3/2005	Aroclor 1254	100	UJ	UG/KG
SB-15 - A	SOIL	10/3/2005	Aroclor 1221	100	UJ	UG/KG
SB-15 - A	SOIL	10/3/2005	Aroclor 1232	100	UJ	UG/KG
SB-15 - A	SOIL	10/3/2005	Aroclor 1248	100	UJ	UG/KG
SB-15 - A	SOIL	10/3/2005	Aroclor 1016	100	UJ	UG/KG
SB-15 - A	SOIL	10/3/2005	Aroclor 1242	100	UJ	UG/KG
SB-15	SOIL	10/3/2005	4-Nitroaniline	20000	UJ	UG/KG
SB-15	SOIL	10/3/2005	4-Nitrophenol	20000	U	UG/KG
SB-15	SOIL	10/3/2005	Benzaldehyde	8400	UJ	UG/KG
SB-15	SOIL	10/3/2005	4-Bromophenyl phenyl ether	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Caprolactam	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2,4-Dimethylphenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	4-Methylphenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	4-Chloroaniline	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2,2'-Oxybis(1-Chloropropane)	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Phenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Bis(2-chloroethyl) ether	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Bis(2-chloroethoxy) methane	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Bis(2-ethylhexyl) phthalate	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Di-n-octyl phthalate	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Hexachlorobenzene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Anthracene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2,4-Dichlorophenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2,4-Dinitrotoluene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Pyrene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Dimethyl phthalate	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Dibenzofuran	8400	U	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-15	SOIL	10/3/2005	Benzo(ghi)perylene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Atrazine	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Indeno(1,2,3-cd)pyrene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Benzo(b)fluoranthene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Fluoranthene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Benzo(k)fluoranthene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Acenaphthylene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Chrysene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Benzo(a)pyrene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2,4-Dinitrophenol	20000	UJ	UG/KG
SB-15	SOIL	10/3/2005	Dibenzo(a,h)anthracene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	4,6-Dinitro-2-methylphenol	20000	U	UG/KG
SB-15	SOIL	10/3/2005	Benzo(a)anthracene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	4-Chloro-3-methylphenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2,6-Dinitrotoluene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	N-Nitroso-Di-n-propylamine	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Hexachloroethane	8400	U	UG/KG
SB-15	SOIL	10/3/2005	4-Chlorophenyl phenyl ether	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Hexachlorocyclopentadiene	8400	UJ	UG/KG
SB-15	SOIL	10/3/2005	Isophorone	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Acenaphthene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Diethyl phthalate	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Di-n-butyl phthalate	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Phenanthrene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Butyl benzyl phthalate	8400	U	UG/KG
SB-15	SOIL	10/3/2005	N-nitrosodiphenylamine	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Fluorene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Carbazole	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Hexachlorobutadiene	8400	U	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-15	SOIL	10/3/2005	Pentachlorophenol	20000	UJ	UG/KG
SB-15	SOIL	10/3/2005	2,4,6-Trichlorophenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2-Nitroaniline	20000	U	UG/KG
SB-15	SOIL	10/3/2005	2-Nitrophenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Naphthalene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2-Methylnaphthalene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2-Chloronaphthalene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	3,3'-Dichlorobenzidine	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Biphenyl	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2-Methylphenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2-Chlorophenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	2,4,5-Trichlorophenol	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Acetophenone	8400	U	UG/KG
SB-15	SOIL	10/3/2005	Nitrobenzene	8400	U	UG/KG
SB-15	SOIL	10/3/2005	3-Nitroaniline	20000	U	UG/KG
SB-15 - M	SOIL	10/3/2005	Aluminum - Total	8710		MG/KG
SB-15 - M	SOIL	10/3/2005	Antimony - Total	0.6	J	MG/KG
SB-15 - M	SOIL	10/3/2005	Arsenic - Total	6.8		MG/KG
SB-15 - M	SOIL	10/3/2005	Barium - Total	127		MG/KG
SB-15 - M	SOIL	10/3/2005	Beryllium - Total	1.2	U	MG/KG
SB-15 - M	SOIL	10/3/2005	Cadmium - Total	1.9		MG/KG
SB-15 - M	SOIL	10/3/2005	Calcium - Total	7130		MG/KG
SB-15 - M	SOIL	10/3/2005	Chromium - Total	22.2		MG/KG
SB-15 - M	SOIL	10/3/2005	Cobalt - Total	6.6		MG/KG
SB-15 - M	SOIL	10/3/2005	Copper - Total	54.3		MG/KG
SB-15 - M	SOIL	10/3/2005	Iron - Total	53100		MG/KG
SB-15 - M	SOIL	10/3/2005	Lead - Total	142	**R**	MG/KG
SB-15 - M	SOIL	10/3/2005	Magnesium - Total	2730		MG/KG
SB-15 - M	SOIL	10/3/2005	Manganese - Total	444	J	MG/KG
SB-15 - M	SOIL	10/3/2005	Mercury - Total	0.633		MG/KG
SB-15 - M	SOIL	10/3/2005	Nickel - Total	21.2		MG/KG
SB-15 - M	SOIL	10/3/2005	Potassium - Total	1160		MG/KG
SB-15 - M	SOIL	10/3/2005	Selenium - Total	3.5	B	MG/KG
SB-15 - M	SOIL	10/3/2005	Silver - Total	2.4	U	MG/KG
SB-15 - M	SOIL	10/3/2005	Sodium - Total	72.6	B	MG/KG
SB-15 - M	SOIL	10/3/2005	Thallium - Total	0.8	B	MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-15 - M	SOIL	10/3/2005	Vanadium - Total	18.5		MG/KG
SB-15 - M	SOIL	10/3/2005	Zinc - Total	791	J	MG/KG
SB-17 - A	SOIL	10/3/2005	Aroclor 1260	98	UJ	UG/KG
SB-17 - A	SOIL	10/3/2005	Aroclor 1254	98	UJ	UG/KG
SB-17 - A	SOIL	10/3/2005	Aroclor 1221	98	UJ	UG/KG
SB-17 - A	SOIL	10/3/2005	Aroclor 1232	98	UJ	UG/KG
SB-17 - A	SOIL	10/3/2005	Aroclor 1248	98	UJ	UG/KG
SB-17 - A	SOIL	10/3/2005	Aroclor 1016	98	UJ	UG/KG
SB-17 - A	SOIL	10/3/2005	Aroclor 1242	98	UJ	UG/KG
SB-17	SOIL	10/3/2005	4-Nitroaniline	970	UJ	UG/KG
SB-17	SOIL	10/3/2005	4-Nitrophenol	970	U	UG/KG
SB-17	SOIL	10/3/2005	Benzaldehyde	400	UJ	UG/KG
SB-17	SOIL	10/3/2005	4-Bromophenyl phenyl ether	400	U	UG/KG
SB-17	SOIL	10/3/2005	Caprolactam	400	U	UG/KG
SB-17	SOIL	10/3/2005	2,4-Dimethylphenol	400	U	UG/KG
SB-17	SOIL	10/3/2005	4-Methylphenol	400	U	UG/KG
SB-17	SOIL	10/3/2005	4-Chloroaniline	400	U	UG/KG
SB-17	SOIL	10/3/2005	2,2'-Oxybis(1-Chloropropane)	400	U	UG/KG
SB-17	SOIL	10/3/2005	Phenol	400	U	UG/KG
SB-17	SOIL	10/3/2005	Bis(2-chloroethyl) ether	400	U	UG/KG
SB-17	SOIL	10/3/2005	Bis(2-chloroethoxy) methane	400	U	UG/KG
SB-17	SOIL	10/3/2005	Bis(2-ethylhexyl) phthalate	43	J	UG/KG
SB-17	SOIL	10/3/2005	Di-n-octyl phthalate	400	U	UG/KG
SB-17	SOIL	10/3/2005	Hexachlorobenzene	400	U	UG/KG
SB-17	SOIL	10/3/2005	Anthracene	400	U	UG/KG
SB-17	SOIL	10/3/2005	2,4-Dichlorophenol	400	U	UG/KG
SB-17	SOIL	10/3/2005	2,4-Dinitrotoluene	400	U	UG/KG
SB-17	SOIL	10/3/2005	Pyrene	33	J	UG/KG
SB-17	SOIL	10/3/2005	Dimethyl phthalate	400	U	UG/KG
SB-17	SOIL	10/3/2005	Dibenzofuran	33	J	UG/KG
SB-17	SOIL	10/3/2005	Benzo(ghi)perylene	400	U	UG/KG
SB-17	SOIL	10/3/2005	Atrazine	400	U	UG/KG
SB-17	SOIL	10/3/2005	Indeno(1,2,3-cd)pyrene	400	U	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-17	SOIL	10/3/2005	Benzo(b)fluoranthene	19	J	UG/KG
SB-17	SOIL	10/3/2005	Fluoranthene	26	J	UG/KG
SB-17	SOIL	10/3/2005	Benzo(k)fluoranthene	400	U	UG/KG
SB-17	SOIL	10/3/2005	Acenaphthylene	400	U	UG/KG
SB-17	SOIL	10/3/2005	Chrysene	16	J	UG/KG
SB-17	SOIL	10/3/2005	Benzo(a)pyrene	400	U	UG/KG
SB-17	SOIL	10/3/2005	2,4-Dinitrophenol	970	UJ	UG/KG
SB-17	SOIL	10/3/2005	Dibenzo(a,h)anthracene	400	U	UG/KG
SB-17	SOIL	10/3/2005	4,6-Dinitro-2-methylphenol	970	U	UG/KG
SB-17	SOIL	10/3/2005	Benzo(a)anthracene	16	J	UG/KG
SB-17	SOIL	10/3/2005	4-Chloro-3-methylphenol	400	U	UG/KG
SB-17	SOIL	10/3/2005	2,6-Dinitrotoluene	400	U	UG/KG
SB-17	SOIL	10/3/2005	N-Nitroso-Di-n-propylamine	400	U	UG/KG
SB-17	SOIL	10/3/2005	Hexachloroethane	400	U	UG/KG
SB-17	SOIL	10/3/2005	4-Chlorophenyl phenyl ether	400	U	UG/KG
SB-17	SOIL	10/3/2005	Hexachlorocyclopentadiene	400	UJ	UG/KG
SB-17	SOIL	10/3/2005	Isophorone	400	U	UG/KG
SB-17	SOIL	10/3/2005	Acenaphthene	400	U	UG/KG
SB-17	SOIL	10/3/2005	Diethyl phthalate	400	U	UG/KG
SB-17	SOIL	10/3/2005	Di-n-butyl phthalate	400	U	UG/KG
SB-17	SOIL	10/3/2005	Phenanthrene	83	J	UG/KG
SB-17	SOIL	10/3/2005	Butyl benzyl phthalate	400	U	UG/KG
SB-17	SOIL	10/3/2005	N-nitrosodiphenylamine	400	U	UG/KG
SB-17	SOIL	10/3/2005	Fluorene	400	U	UG/KG
SB-17	SOIL	10/3/2005	Carbazole	400	U	UG/KG
SB-17	SOIL	10/3/2005	Hexachlorobutadiene	400	U	UG/KG
SB-17	SOIL	10/3/2005	Pentachlorophenol	970	UJ	UG/KG
SB-17	SOIL	10/3/2005	2,4,6-Trichlorophenol	400	U	UG/KG
SB-17	SOIL	10/3/2005	2-Nitroaniline	970	U	UG/KG
SB-17	SOIL	10/3/2005	2-Nitrophenol	400	U	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-17	SOIL	10/3/2005	Naphthalene	100	J	UG/KG
SB-17	SOIL	10/3/2005	2-Methylnaphthalene	130	J	UG/KG
SB-17	SOIL	10/3/2005	2-Chloronaphthalene	400	U	UG/KG
SB-17	SOIL	10/3/2005	3,3'-Dichlorobenzidine	400	U	UG/KG
SB-17	SOIL	10/3/2005	Biphenyl	400	U	UG/KG
SB-17	SOIL	10/3/2005	2-Methylphenol	400	U	UG/KG
SB-17	SOIL	10/3/2005	2-Chlorophenol	400	U	UG/KG
SB-17	SOIL	10/3/2005	2,4,5-Trichlorophenol	400	U	UG/KG
SB-17	SOIL	10/3/2005	Acetophenone	400	U	UG/KG
SB-17	SOIL	10/3/2005	Nitrobenzene	400	U	UG/KG
SB-17	SOIL	10/3/2005	3-Nitroaniline	970	U	UG/KG
SB-17 - M	SOIL	10/3/2005	Aluminum - Total	2010		MG/KG
SB-17 - M	SOIL	10/3/2005	Antimony - Total	0.57	U	MG/KG
SB-17 - M	SOIL	10/3/2005	Arsenic - Total	9.5		MG/KG
SB-17 - M	SOIL	10/3/2005	Barium - Total	66.1		MG/KG
SB-17 - M	SOIL	10/3/2005	Beryllium - Total	1.2	U	MG/KG
SB-17 - M	SOIL	10/3/2005	Cadmium - Total	0.05	U	MG/KG
SB-17 - M	SOIL	10/3/2005	Calcium - Total	1230	U	MG/KG
SB-17 - M	SOIL	10/3/2005	Chromium - Total	5.8		MG/KG
SB-17 - M	SOIL	10/3/2005	Cobalt - Total	12.3	U	MG/KG
SB-17 - M	SOIL	10/3/2005	Copper - Total	24.8		MG/KG
SB-17 - M	SOIL	10/3/2005	Iron - Total	28000		MG/KG
SB-17 - M	SOIL	10/3/2005	Lead - Total	10.7		MG/KG
SB-17 - M	SOIL	10/3/2005	Magnesium - Total	1230	U	MG/KG
SB-17 - M	SOIL	10/3/2005	Manganese - Total	18.6		MG/KG
SB-17 - M	SOIL	10/3/2005	Mercury - Total	0.017	U	MG/KG
SB-17 - M	SOIL	10/3/2005	Nickel - Total	6.4		MG/KG
SB-17 - M	SOIL	10/3/2005	Potassium - Total	1230	U	MG/KG
SB-17 - M	SOIL	10/3/2005	Selenium - Total	2.4	B	MG/KG
SB-17 - M	SOIL	10/3/2005	Silver - Total	2.5	U	MG/KG
SB-17 - M	SOIL	10/3/2005	Sodium - Total	57.3	B	MG/KG
SB-17 - M	SOIL	10/3/2005	Thallium - Total	0.72	B	MG/KG
SB-17 - M	SOIL	10/3/2005	Vanadium - Total	12.4		MG/KG
SB-17 - M	SOIL	10/3/2005	Zinc - Total	19.6		MG/KG
SB-19 - A	SOIL	10/3/2005	Aroclor 1260	90	UJ	UG/KG
SB-19 - A	SOIL	10/3/2005	Aroclor 1254	90	UJ	UG/KG
SB-19 - A	SOIL	10/3/2005	Aroclor 1221	90	UJ	UG/KG
SB-19 - A	SOIL	10/3/2005	Aroclor 1232	90	UJ	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-19 - A	SOIL	10/3/2005	Aroclor 1248	90	UJ	UG/KG
SB-19 - A	SOIL	10/3/2005	Aroclor 1016	90	UJ	UG/KG
SB-19 - A	SOIL	10/3/2005	Aroclor 1242	90	UJ	UG/KG
SB-19	SOIL	10/3/2005	4-Nitroaniline	18000	UJ	UG/KG
SB-19	SOIL	10/3/2005	4-Nitrophenol	18000	U	UG/KG
SB-19	SOIL	10/3/2005	Benzaldehyde	7400	UJ	UG/KG
SB-19	SOIL	10/3/2005	4-Bromophenyl phenyl ether	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Caprolactam	7400	U	UG/KG
SB-19	SOIL	10/3/2005	2,4-Dimethylphenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	4-Methylphenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	4-Chloroaniline	7400	U	UG/KG
SB-19	SOIL	10/3/2005	2,2'-Oxybis(1-Chloropropane)	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Phenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Bis(2-chloroethyl) ether	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Bis(2-chloroethoxy) methane	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Bis(2-ethylhexyl) phthalate	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Di-n-octyl phthalate	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Hexachlorobenzene	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Anthracene	1400	J	UG/KG
SB-19	SOIL	10/3/2005	2,4-Dichlorophenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	2,4-Dinitrotoluene	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Pyrene	8700		UG/KG
SB-19	SOIL	10/3/2005	Dimethyl phthalate	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Dibenzofuran	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Benzo(ghi)perylene	7300	J	UG/KG
SB-19	SOIL	10/3/2005	Atrazine	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Indeno(1,2,3-cd)pyrene	6100	J	UG/KG
SB-19	SOIL	10/3/2005	Benzo(b)fluoranthene	8400		UG/KG
SB-19	SOIL	10/3/2005	Fluoranthene	9200		UG/KG
SB-19	SOIL	10/3/2005	Benzo(k)fluoranthene	3100	J	UG/KG
SB-19	SOIL	10/3/2005	Acenaphthylene	2800	J	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-19	SOIL	10/3/2005	Chrysene	6100	J	UG/KG
SB-19	SOIL	10/3/2005	Benzo(a)pyrene	7700		UG/KG
SB-19	SOIL	10/3/2005	2,4-Dinitrophenol	18000	UJ	UG/KG
SB-19	SOIL	10/3/2005	Dibenzo(a,h)anthracene	1900	J	UG/KG
SB-19	SOIL	10/3/2005	4,6-Dinitro-2-methylphenol	18000	U	UG/KG
SB-19	SOIL	10/3/2005	Benzo(a)anthracene	6800	J	UG/KG
SB-19	SOIL	10/3/2005	4-Chloro-3-methylphenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	2,6-Dinitrotoluene	7400	U	UG/KG
SB-19	SOIL	10/3/2005	N-Nitroso-Di-n-propylamine	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Hexachloroethane	7400	U	UG/KG
SB-19	SOIL	10/3/2005	4-Chlorophenyl phenyl ether	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Hexachlorocyclopentadiene	7400	UJ	UG/KG
SB-19	SOIL	10/3/2005	Isophorone	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Acenaphthene	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Diethyl phthalate	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Di-n-butyl phthalate	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Phenanthrene	3200	J	UG/KG
SB-19	SOIL	10/3/2005	Butyl benzyl phthalate	7400	U	UG/KG
SB-19	SOIL	10/3/2005	N-nitrosodiphenylamine	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Fluorene	310	J	UG/KG
SB-19	SOIL	10/3/2005	Carbazole	360	J	UG/KG
SB-19	SOIL	10/3/2005	Hexachlorobutadiene	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Pentachlorophenol	18000	UJ	UG/KG
SB-19	SOIL	10/3/2005	2,4,6-Trichlorophenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	2-Nitroaniline	18000	U	UG/KG
SB-19	SOIL	10/3/2005	2-Nitrophenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Naphthalene	7400	U	UG/KG
SB-19	SOIL	10/3/2005	2-Methylnaphthalene	7400	U	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-19	SOIL	10/3/2005	2-Chloronaphthalene	7400	U	UG/KG
SB-19	SOIL	10/3/2005	3,3'-Dichlorobenzidine	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Biphenyl	7400	U	UG/KG
SB-19	SOIL	10/3/2005	2-Methylphenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	2-Chlorophenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	2,4,5-Trichlorophenol	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Acetophenone	7400	U	UG/KG
SB-19	SOIL	10/3/2005	Nitrobenzene	7400	U	UG/KG
SB-19	SOIL	10/3/2005	3-Nitroaniline	18000	U	UG/KG
SB-19 - M	SOIL	10/3/2005	Aluminum - Total	4540		MG/KG
SB-19 - M	SOIL	10/3/2005	Antimony - Total	0.51	U	MG/KG
SB-19 - M	SOIL	10/3/2005	Arsenic - Total	19.6		MG/KG
SB-19 - M	SOIL	10/3/2005	Barium - Total	93.8		MG/KG
SB-19 - M	SOIL	10/3/2005	Beryllium - Total	0.64		MG/KG
SB-19 - M	SOIL	10/3/2005	Cadmium - Total	0.34	B	MG/KG
SB-19 - M	SOIL	10/3/2005	Calcium - Total	12100		MG/KG
SB-19 - M	SOIL	10/3/2005	Chromium - Total	9.1		MG/KG
SB-19 - M	SOIL	10/3/2005	Cobalt - Total	10.9	U	MG/KG
SB-19 - M	SOIL	10/3/2005	Copper - Total	44.2		MG/KG
SB-19 - M	SOIL	10/3/2005	Iron - Total	15600		MG/KG
SB-19 - M	SOIL	10/3/2005	Lead - Total	149		MG/KG
SB-19 - M	SOIL	10/3/2005	Magnesium - Total	4000		MG/KG
SB-19 - M	SOIL	10/3/2005	Manganese - Total	154		MG/KG
SB-19 - M	SOIL	10/3/2005	Mercury - Total	0.143		MG/KG
SB-19 - M	SOIL	10/3/2005	Nickel - Total	14.2		MG/KG
SB-19 - M	SOIL	10/3/2005	Potassium - Total	1100	U	MG/KG
SB-19 - M	SOIL	10/3/2005	Selenium - Total	1.9	B	MG/KG
SB-19 - M	SOIL	10/3/2005	Silver - Total	2.2	U	MG/KG
SB-19 - M	SOIL	10/3/2005	Sodium - Total	99.9	B	MG/KG
SB-19 - M	SOIL	10/3/2005	Thallium - Total	0.75	B	MG/KG
SB-19 - M	SOIL	10/3/2005	Vanadium - Total	14.6		MG/KG
SB-19 - M	SOIL	10/3/2005	Zinc - Total	106		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-20-A	SOIL	10/6/2005	Aroclor 1260	99	U	UG/KG
SB-20-A	SOIL	10/6/2005	Aroclor 1254	99	U	UG/KG
SB-20-A	SOIL	10/6/2005	Aroclor 1221	99	U	UG/KG
SB-20-A	SOIL	10/6/2005	Aroclor 1232	99	U	UG/KG
SB-20-A	SOIL	10/6/2005	Aroclor 1248	99	U	UG/KG
SB-20-A	SOIL	10/6/2005	Aroclor 1016	99	U	UG/KG
SB-20-A	SOIL	10/6/2005	Aroclor 1242	99	U	UG/KG
SB-20	SOIL	10/6/2005	4-Nitroaniline	9900	U	UG/KG
SB-20	SOIL	10/6/2005	4-Nitrophenol	9900	U	UG/KG
SB-20	SOIL	10/6/2005	Benzaldehyde	4100	UJ	UG/KG
SB-20	SOIL	10/6/2005	4-Bromophenyl phenyl ether	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Caprolactam	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2,4-Dimethylphenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	4-Methylphenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	4-Chloroaniline	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2,2'-Oxybis(1-Chloropropane)	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Phenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Bis(2-chloroethyl) ether	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Bis(2-chloroethoxy) methane	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Bis(2-ethylhexyl) phthalate	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Di-n-octyl phthalate	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Hexachlorobenzene	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Anthracene	420	J	UG/KG
SB-20	SOIL	10/6/2005	2,4-Dichlorophenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2,4-Dinitrotoluene	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Pyrene	3100	J	UG/KG
SB-20	SOIL	10/6/2005	Dimethyl phthalate	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Dibenzofuran	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Benzo(ghi)perylene	1200	J	UG/KG
SB-20	SOIL	10/6/2005	Atrazine	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Indeno(1,2,3-cd)pyrene	1000	J	UG/KG
SB-20	SOIL	10/6/2005	Benzo(b)fluoranthene	1900	J	UG/KG
SB-20	SOIL	10/6/2005	Fluoranthene	4000	J	UG/KG
SB-20	SOIL	10/6/2005	Benzo(k)fluoranthene	650	J	UG/KG
SB-20	SOIL	10/6/2005	Acenaphthylene	340	J	UG/KG
SB-20	SOIL	10/6/2005	Chrysene	1500	J	UG/KG
SB-20	SOIL	10/6/2005	Benzo(a)pyrene	1500	J	UG/KG
SB-20	SOIL	10/6/2005	2,4-Dinitrophenol	9900	UJ	UG/KG
SB-20	SOIL	10/6/2005	Dibenzo(a,h)anthracene	310	J	UG/KG
SB-20	SOIL	10/6/2005	4,6-Dinitro-2-methylphenol	9900	U	UG/KG
SB-20	SOIL	10/6/2005	Benzo(a)anthracene	1700	J	UG/KG
SB-20	SOIL	10/6/2005	4-Chloro-3-methylphenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2,6-Dinitrotoluene	4100	U	UG/KG
SB-20	SOIL	10/6/2005	N-Nitroso-Di-n-propylamine	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Hexachloroethane	4100	U	UG/KG
SB-20	SOIL	10/6/2005	4-Chlorophenyl phenyl ether	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Hexachlorocyclopentadiene	4100	UJ	UG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-20	SOIL	10/6/2005	Isophorone	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Acenaphthene	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Diethyl phthalate	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Di-n-butyl phthalate	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Phenanthrene	2300	J	UG/KG
SB-20	SOIL	10/6/2005	Butyl benzyl phthalate	4100	U	UG/KG
SB-20	SOIL	10/6/2005	N-nitrosodiphenylamine	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Fluorene	170	J	UG/KG
SB-20	SOIL	10/6/2005	Carbazole	220	J	UG/KG
SB-20	SOIL	10/6/2005	Hexachlorobutadiene	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Pentachlorophenol	9900	UJ	UG/KG
SB-20	SOIL	10/6/2005	2,4,6-Trichlorophenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2-Nitroaniline	9900	UJ	UG/KG
SB-20	SOIL	10/6/2005	2-Nitrophenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Naphthalene	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2-Methylnaphthalene	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2-Chloronaphthalene	4100	U	UG/KG
SB-20	SOIL	10/6/2005	3,3'-Dichlorobenzidine	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Biphenyl	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2-Methylphenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2-Chlorophenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	2,4,5-Trichlorophenol	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Acetophenone	4100	U	UG/KG
SB-20	SOIL	10/6/2005	Nitrobenzene	4100	U	UG/KG
SB-20	SOIL	10/6/2005	3-Nitroaniline	9900	U	UG/KG
SB-20-M	SOIL	10/6/2005	Aluminum - Total	2410		MG/KG
SB-20-M	SOIL	10/6/2005	Antimony - Total	7.1	U	MG/KG
SB-20-M	SOIL	10/6/2005	Arsenic - Total	15.8	J	MG/KG
SB-20-M	SOIL	10/6/2005	Barium - Total	62		MG/KG
SB-20-M	SOIL	10/6/2005	Beryllium - Total	0.59	U	MG/KG
SB-20-M	SOIL	10/6/2005	Cadmium - Total	0.34	J	MG/KG
SB-20-M	SOIL	10/6/2005	Calcium - Total	8130		MG/KG
SB-20-M	SOIL	10/6/2005	Chromium - Total	5.1		MG/KG
SB-20-M	SOIL	10/6/2005	Cobalt - Total	2.4	J	MG/KG
SB-20-M	SOIL	10/6/2005	Copper - Total	24.9		MG/KG
SB-20-M	SOIL	10/6/2005	Iron - Total	11400		MG/KG
SB-20-M	SOIL	10/6/2005	Lead - Total	70.2		MG/KG
SB-20-M	SOIL	10/6/2005	Magnesium - Total	1820		MG/KG
SB-20-M	SOIL	10/6/2005	Manganese - Total	100		MG/KG
SB-20-M	SOIL	10/6/2005	Mercury - Total	0.054		MG/KG
SB-20-M	SOIL	10/6/2005	Nickel - Total	9.1		MG/KG
SB-20-M	SOIL	10/6/2005	Potassium - Total	299	J	MG/KG
SB-20-M	SOIL	10/6/2005	Selenium - Total	0.97	J	MG/KG
SB-20-M	SOIL	10/6/2005	Silver - Total	0.09	J	MG/KG
SB-20-M	SOIL	10/6/2005	Sodium - Total	81.9	J	MG/KG
SB-20-M	SOIL	10/6/2005	Thallium - Total	0.66	U	MG/KG
SB-20-M	SOIL	10/6/2005	Vanadium - Total	12		MG/KG

SAMPLE NAME	SAMPLE MATRIX	SAMPLE DATE	CHEMICAL NAME	RESULT VALUE	EPA DESA VALIDATOR QUALIFIERS	RESULT UNIT
SB-20-M	SOIL	10/6/2005	Zinc - Total	71.2		MG/KG
SB-23	SOIL	10/6/2005	Aroclor 1260	100	U	UG/KG
SB-23	SOIL	10/6/2005	Aroclor 1254	100	U	UG/KG
SB-23	SOIL	10/6/2005	Aroclor 1221	100	U	UG/KG
SB-23	SOIL	10/6/2005	Aroclor 1232	100	U	UG/KG
SB-23	SOIL	10/6/2005	Aroclor 1248	100	U	UG/KG
SB-23	SOIL	10/6/2005	Aroclor 1016	100	U	UG/KG
SB-23	SOIL	10/6/2005	Aroclor 1242	100	U	UG/KG
SB-23-M	SOIL	10/6/2005	Arsenic - Total	17.2		MG/KG
SB-23-M	SOIL	10/6/2005	Chromium - Total	6.6		MG/KG
SB-23-M	SOIL	10/6/2005	Copper - Total	41.9		MG/KG
SB-23-M	SOIL	10/6/2005	Lead - Total	169		MG/KG
SB-23-M	SOIL	10/6/2005	Zinc - Total	172		MG/KG
SB-24	SOIL	10/6/2005	Aroclor 1260	15	J	UG/KG
SB-24	SOIL	10/6/2005	Aroclor 1254	93	U	UG/KG
SB-24	SOIL	10/6/2005	Aroclor 1221	93	U	UG/KG
SB-24	SOIL	10/6/2005	Aroclor 1232	93	U	UG/KG
SB-24	SOIL	10/6/2005	Aroclor 1248	93	U	UG/KG
SB-24	SOIL	10/6/2005	Aroclor 1016	93	U	UG/KG
SB-24	SOIL	10/6/2005	Aroclor 1242	93	U	UG/KG
SB-24-M	SOIL	10/6/2005	Arsenic - Total	5.3		MG/KG
SB-24-M	SOIL	10/6/2005	Chromium - Total	9.2		MG/KG
SB-24-M	SOIL	10/6/2005	Copper - Total	25.1		MG/KG
SB-24-M	SOIL	10/6/2005	Lead - Total	190		MG/KG
SB-24-M	SOIL	10/6/2005	Zinc - Total	107		MG/KG

TABLE 1.1 (Property A)
SELECTION OF EXPOSURE PATHWAYS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe	Media	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface Soil (0 to 1.2 Feet)	Surface Soil (0 to 1.2 Feet)	Residence (Property A)	Resident	Adult	Ingestion	Quantitative	The property is zoned residential but lacks a residential structure. The potential exists that this property may be used for a residence in the future.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
			Residence (Property A)	Resident	Young Child (1 to 6 years of age) and a child from birth to < 16 years for exposures to chemicals with a Mutagenic Mode of Action.	Ingestion	Quantitative	The property is zones residential but lacks a residential structure. The potential exists that this property may be used for a residence in the future.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
Future	Subsurface Soil	Subsurface Soil	Residence (Property A)	Construction/ Utility Worker	Adult	Ingestion	Qualitative	The potential exists for a worker to be exposed in the future to subsurface soil during construction activities. This pathway was evaluated qualitatively based on a lack of subsurface soil data.
						Inhalation of Fugitive Dust	Qualitative	
						Dermal Contact	Quantitative	

TABLE 2.1 * (Property A)
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Medium: Surface Soil (<1.2 Feet)
Exposure Medium: Surface Soil (< 1.2 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (Cancer/Noncancer) (2)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property A)	1336-36-3	Total PCBs	0.080 (J)	0.266 (J)	mg/kg	SS-43	3/5	0.080 (J) - 0.266 (J)	0.266 (J)	NA	0.22 (Cancer)			Y	ASL
	7440-38-2	Arsenic (inorganic)	5.8 (N)	24	mg/kg	SB-5	5/5	5.8 (N) - 24	24	NA	0.61 (Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	10.7 (EN)	27.3 (E)	mg/kg	SB-5	5/5	10.7 (EN) - 27.3 (E)	27.3 (E)	NA	0.29 (Cancer)			Y	ASL
	7440-50-8	Copper	37.1 (EN)	370(N)	mg/kg	SB-4	5/5	37.1 (EN) - 370 (N)	370 (N)	NA	310 (Noncancer)			Y	ASL
	7439-92-1	Lead	158 (E)	3,680 (E)	mg/kg	SS-21	6/6	158 (E) - 3,680 (E)	3,680 (E)	NA	400			Y	ASL
	7440-66-6	Zinc	146 (E)	424 (E)	mg/kg	SB-5	5/5	146 (E) - 424 (E)	424 (E)	NA	2,300 (Noncancer)			N	BSL

(1) Maximum concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on the lowest concentration in soil associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the assessment (http://www.epa.gov/region9/superfund/prg/).

TABLE 3.1.RME* (Property A)
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Medium: Surface Soil (< 1.2 Feet)
Exposure Medium: Surface Soil (< 1.2 Feet)

Exposure Point	Chemicals of Potential Concern	Units	Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale (1)
Surface Soil (< 1.2 Feet)	Total PCBs	mg/kg	0.1	Data appear Normal and Log Normal at 5% Significance Level	0.266 (J)	0.2	mg/kg	95% Students -t UCL	ProUCL 4.1
	Arsenic (inorganic)	mg/kg	15.5	Data Appear Normal and Log Normal at 5% Significance Level	24	23.3	mg/kg	95% Students -t UCL	ProUCL 4.1
	Chromium (VI)	mg/kg	17.7	Data Appear Normal and Log Normal at 5% Significance Level	27.3 (E)	23.6	mg/kg	95% Students -t UCL	ProUCL 4.1
	Copper	mg/kg	148.5	Data Appear Normal and Log Normal at 5% Significance Level	370 (N)	272.1	mg/kg	95% Students -t UCL	ProUCL 4.1
	Lead	mg/kg	1,088	Log Normal at 5% Significance Level but not Normal at 5% Significance Level	3,680 (E)	1,088	mg/kg	Mean (used consistent with guidance for addressing lead. (Approximate gamma 95% UCL is 3,042)	ProUCL 4.1

(1) Utilized ProUCL Version 4.1 available at: http://www.epa.gov/osp/hstl/tsc/software.htm.

* All acronyms are defined at the beginning of Appendix B.

Table 3.2 * - Summary of Property A Data.

List of Chemical Specific Concentrations in Soil and Calculated Mean Concentration of Lead in Soil.

PCBs (mg/kg)	Location of PCB Samples	Arsenic (mg/kg)	Location of Arsenic Samples	Chromium (mg/kg)	Location of Chromium Samples	Copper (mg/kg)	Location of Copper Samples	Lead (mg/kg)	Location of Lead Samples
0.176 (J)	SS-39	14.8 (N)	SS-39	19.4 (EN)	SS-39	132 (EN)	SS-39	3680 (E)	SS-21
0.08 (J)	SS-40	5.8 (N)	SS-40	10.7 (EN)	SS-40	37.1 (EN)	SS-40	662 (E)	SS-39
0.266 (J)	SS-43	9.4 (N)	SS-43	14.5 (EN)	SS-43	78.5 (EN)	SS-43	158 (E)	SS-40
0.05		23.4	SB-4	16.4 (E)	SB-4	370 (N)	SB-4	380 (E)	SS-43
0.05		24	SB-5	27.3 (E)	SB-5	125 (N)	SB-5	757 (E)	SB-4
								888 (E)	SB-5
								Average Lead Concentration is 1087.5	

* All acronyms are defined at the beginning of Appendix B.

Table 3-3 - ProUCl Output for Arsenic (Property A)

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic

General Statistics			
Number of Valid Observations	5	Number of Distinct Observations	5
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	5.8	Minimum of Log Data	1.758
Maximum	24	Maximum of Log Data	3.178
Mean	15.48	Mean of log Data	2.605
Median	14.8	SD of log Data	0.61
SD	8.162		
Coefficient of Variation	0.527		
Skewness	-0.0129		

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.899	Shapiro Wilk Test Statistic	0.911
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	23.26	95% H-UCL	44.85
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	33.97
95% Adjusted-CLT UCL (Chen-1995)	21.46	97.5% Chebyshev (MVUE) UCL	41.91
95% Modified-t UCL (Johnson-1978)	23.26	99% Chebyshev (MVUE) UCL	57.49
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.681	Data appear Normal at 5% Significance Level	
Theta Star	9.208		
MLE of Mean	15.48		
MLE of Standard Deviation	11.94		
nu star	16.81		
Approximate Chi Square Value (.05)	8.537	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	21.48
Adjusted Chi Square Value	6.132	95% Jackknife UCL	23.26
		95% Standard Bootstrap UCL	20.74
Anderson-Darling Test Statistic	0.328	95% Bootstrap-t UCL	25.16
Anderson-Darling 5% Critical Value	0.681	95% Hall's Bootstrap UCL	23.45
Kolmogorov-Smirnov Test Statistic	0.25	95% Percentile Bootstrap UCL	20.96
Kolmogorov-Smirnov 5% Critical Value	0.359	95% BCA Bootstrap UCL	20.84
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	31.39
		97.5% Chebyshev(Mean, Sd) UCL	38.27
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	51.8
95% Approximate Gamma UCL	30.48		
95% Adjusted Gamma UCL	42.44		
Potential UCL to Use		Use 95% Student's-t UCL	23.26

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3-4 - ProUCl Output for Chromium. (Property A)

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Chromium

General Statistics			
Number of Valid Observations	5	Number of Distinct Observations	5
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	10.7	Minimum of Log Data	2.37
Maximum	27.3	Maximum of Log Data	3.307
Mean	17.66	Mean of log Data	2.823
Median	16.4	SD of log Data	0.347
SD	6.244		
Coefficient of Variation	0.354		
Skewness	0.908		

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.957	Shapiro Wilk Test Statistic	0.995
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	23.61	95% H-UCL	27.65
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29.54
95% Adjusted-CLT UCL (Chen-1995)	23.46	97.5% Chebyshev (MVUE) UCL	34.69
95% Modified-t UCL (Johnson-1978)	23.8	99% Chebyshev (MVUE) UCL	44.8
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.32	Data appear Normal at 5% Significance Level	
Theta Star	4.088		
MLE of Mean	17.66		
MLE of Standard Deviation	8.497		
nu star	43.2		
Approximate Chi Square Value (.05)	29.13	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	22.25
Adjusted Chi Square Value	24.19	95% Jackknife UCL	23.61
		95% Standard Bootstrap UCL	21.82
Anderson-Darling Test Statistic	0.188	95% Bootstrap-t UCL	27.02
Anderson-Darling 5% Critical Value	0.679	95% Hall's Bootstrap UCL	54.19
Kolmogorov-Smirnov Test Statistic	0.153	95% Percentile Bootstrap UCL	21.8
Kolmogorov-Smirnov 5% Critical Value	0.358	95% BCA Bootstrap UCL	22.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	29.83
		97.5% Chebyshev(Mean, Sd) UCL	35.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	45.45
95% Approximate Gamma UCL	26.19		
95% Adjusted Gamma UCL	31.53		
Potential UCL to Use		Use 95% Student's-t UCL	23.61

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3-5. - ProUCl Output for Copper (Property A)

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Copper

General Statistics			
Number of Valid Observations	5	Number of Distinct Observations	5
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	37.1	Minimum of Log Data	3.614
Maximum	370	Maximum of Log Data	5.914
Mean	148.5	Mean of log Data	4.72
Median	125	SD of log Data	0.839
SD	129.6		
Coefficient of Variation	0.873		
Skewness	1.745		

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.816	Shapiro Wilk Test Statistic	0.972
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	272.1	95% H-UCL	936.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	380.3
95% Adjusted-CLT UCL (Chen-1995)	292.2	97.5% Chebyshev (MVUE) UCL	481.3
95% Modified-t UCL (Johnson-1978)	279.6	99% Chebyshev (MVUE) UCL	679.7
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.906	Data appear Normal at 5% Significance Level	
Theta Star	163.9		
MLE of Mean	148.5		
MLE of Standard Deviation	156		
nu star	9.063		
Approximate Chi Square Value (.05)	3.365	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	243.9
Adjusted Chi Square Value	2.037	95% Jackknife UCL	272.1
		95% Standard Bootstrap UCL	232.9
Anderson-Darling Test Statistic	0.305	95% Bootstrap-t UCL	410
Anderson-Darling 5% Critical Value	0.685	95% Hall's Bootstrap UCL	677
Kolmogorov-Smirnov Test Statistic	0.267	95% Percentile Bootstrap UCL	227.2
Kolmogorov-Smirnov 5% Critical Value	0.361	95% BCA Bootstrap UCL	264.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	401.2
		97.5% Chebyshev(Mean, Sd) UCL	510.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	725.3
95% Approximate Gamma UCL	400		
95% Adjusted Gamma UCL	660.6		
Potential UCL to Use		Use 95% Student's-t UCL	272.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3-6 - ProUCl Output for Lead (Property A).

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	158	Minimum of Log Data	5.063
Maximum	3680	Maximum of Log Data	8.211
Mean	1088	Mean of log Data	6.521
Median	709.5	SD of log Data	1.04
SD	1297		
Coefficient of Variation	1.193		
Skewness	2.218		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.694	Shapiro Wilk Test Statistic	0.957
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2155	95% H-UCL	8477
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2924
95% Adjusted-CLT UCL (Chen-1995)	2471	97.5% Chebyshev (MVUE) UCL	3740
95% Modified-t UCL (Johnson-1978)	2235	99% Chebyshev (MVUE) UCL	5342
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.712	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1527		
MLE of Mean	1088		
MLE of Standard Deviation	1289		
nu star	8.546		
Approximate Chi Square Value (.05)	3.055	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	1959
Adjusted Chi Square Value	1.999	95% Jackknife UCL	2155
		95% Standard Bootstrap UCL	1893
Anderson-Darling Test Statistic	0.438	95% Bootstrap-t UCL	4573
Anderson-Darling 5% Critical Value	0.712	95% Hall's Bootstrap UCL	6390
Kolmogorov-Smirnov Test Statistic	0.295	95% Percentile Bootstrap UCL	2019
Kolmogorov-Smirnov 5% Critical Value	0.339	95% BCA Bootstrap UCL	2225
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3396
		97.5% Chebyshev(Mean, Sd) UCL	4395
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6357
95% Approximate Gamma UCL	3042		
95% Adjusted Gamma UCL	4649		
Potential UCL to Use		Use 95% Approximate Gamma UCL	3042

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3-7 - ProUCl Output for PCBs (Property A)

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

PCBs

General Statistics			
Number of Valid Observations	5	Number of Distinct Observations	4
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	0.05	Minimum of Log Data	-2.996
Maximum	0.266	Maximum of Log Data	-1.324
Mean	0.124	Mean of log Data	-2.316
Median	0.08	SD of log Data	0.756
SD	0.0945		
Coefficient of Variation	0.76		
Skewness	1.018		

Warning: There are only 4 Distinct Values in this data
There are insufficient Distinct Values to perform some GOF tests and bootstrap methods.
Those methods will return a 'N/A' value on your output display!
It is necessary to have 4 or more Distinct Values to compute bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10-15 or more observations for accurate and meaningful bootstrap results.
Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.846	Shapiro Wilk Test Statistic	0.875
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.215	95% H-UCL	0.57
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.3
95% Adjusted-CLT UCL (Chen-1995)	0.215	97.5% Chebyshev (MVUE) UCL	0.377
95% Modified-t UCL (Johnson-1978)	0.218	99% Chebyshev (MVUE) UCL	0.528
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.058	Data appear Normal at 5% Significance Level	
Theta Star	0.118		
MLE of Mean	0.124		
MLE of Standard Deviation	0.121		
nu star	10.58		
Approximate Chi Square Value (.05)	4.31	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	0.194
Adjusted Chi Square Value	2.747	95% Jackknife UCL	0.215
		95% Standard Bootstrap UCL	0.186
Anderson-Darling Test Statistic	0.431	95% Bootstrap-t UCL	0.48
Anderson-Darling 5% Critical Value	0.684	95% Hall's Bootstrap UCL	0.646
Kolmogorov-Smirnov Test Statistic	0.255	95% Percentile Bootstrap UCL	0.187
Kolmogorov-Smirnov 5% Critical Value	0.36	95% BCA Bootstrap UCL	0.205
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.309
		97.5% Chebyshev(Mean, Sd) UCL	0.388
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.545
95% Approximate Gamma UCL	0.305		
95% Adjusted Gamma UCL	0.479		
Potential UCL to Use		Use 95% Student's-t UCL	0.215

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

USEPA (1991). Risk assessment guidance for Superfund (RAGS). Volume I. Human health evaluation manual - Supplemental Guidance: Standard default exposure factors." Office of Emergency and Remedial Response (Washington, D.C.) OSWER Directive 9285.6-03. March 25, 1991.

USEPA (2004). Risk assessment guidance for Superfund (RAGS). Vol 1: Human health evaluation manual (Part E, Supplemental guidance for dermal risk assessment). Final. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. EPA/540/R/99/005.

USEPA (2012). Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER Directive 9200.1-113. USEPA, Washingtor

TABLE 4.1.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	6	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	6	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - FOR CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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USEPA (2012). Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER 9200.1-113. USEPA, Washington, DC

TABLE 4.2.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer)	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	---
				ED	Exposure Duration (2 to 6 years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (2 years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (4 years)	1460	days/year	EPA 1989	
Inhalation (Cancer)	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	---
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.97	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.3.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	10	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	3650	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 Years)	10	years	EPA1991 and 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION CHEMICALS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.4.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer)	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
Inhalation (Cancer)	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA1991	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.5 .RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 1991	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response,
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TABLE 4.6. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1999	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resdent	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.6.CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (3 years)	1095	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

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TABLE 4.7 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	year	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	year	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.7.CTE MMOA (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE -CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (3 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 2002	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - C *CF
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 2002	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 4.8 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	Mean of IR	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Speicfic	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	yrs	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.8 CTE MMOA for Child (6 to < 16 Years) (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHILD (6 TO < 16 YEARS) MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer)	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (1 years)	365	days/year	EPA 1989	
Inhalation (Cancer)	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 4.9. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemcial Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

'(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.9 CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor (1)	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.10 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer)	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer)	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 5.1 (Property A)

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal (2)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor-1016	Chronic	7E-05	mg/kg-day	1E+00	7E-05	mg/kg-day	Developmental (low birth weight)	100	IRIS	03/11/13
Aroclor-1254	Chronic	2E-05	mg/kg-day	1E+00	2E-05	mg/kg-day	immune system	300	IRIS	03/11/13
Arsenic (inorganic)	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Hyperpigmentation, keratosis and possible vascular complications	3	IRIS	03/11/13
Chromium (VI)	Chronic	3E-03	mg/kg-day	3E-02	8E-05	mg/kg-day	No Observed Adverse Effect Level	300	IRIS	03/11/13
Copper	Chronic	4E-02	mg/kg-day	1E+00	4E-02	mg/kg-day	Irritation	(Not Stated)	HEAST	07/01/97

(1) Risk Assessment Guidance (RAGS) for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

(2) A dermal RfD was developed based on recommendations in RAGS Part E. USEPA (2004). Risk assessment guidance for Superfund (RAGS). Vol 1: human health evaluation manual (part E, supplemental guidance for dermal risk assessment). Final. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. EPA/540/R/99/005.

TABLE 5.2* (Property A)
NON-CANCER TOXICITY DATA -- INHALATION
Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Chronic/ Subchronic	Inhalation Reference Concentration		Extrapolated Reference Dose		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	Reference Concentration: Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor 1254	Chronic	7E-05	mg/m^3			immune system	100	Route to Route Extrapolation	03/11/13
Aroclor 1016	Chronic	2E-04	mg/m^3			reduced birthweight	300	Route to Route Extrapolation	03/11/13
Arsenic (inorganic)	Chronic	1.5E-05	mg/m^3			Development; cardiovascular system; nervous system; lung; skin	Not Listed	CalEPA	03/11/13
Chromium (VI)	Chronic	1E-04	mg/m^3			Lactate dehydrogenase in bronchioalveolar lavage fluid	300	IRIS	03/11/13
Copper	Chronic	NA	mg/m^3			NA	NA	IRIS	03/11/13

* A list of acornymns is provided at the beginning of Appendix B.

TABLE 6.1* (Property A)

CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units	(1)	Value (2)	Units	(3)	Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Arsenic (inorganic)	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/13/2013
Chromium (VI)	5.0E-01	$(mg/kg\text{-}day)^{-1}$	3E-02	2.0E+01	$(mg/kg\text{-}day)^{-1}$	A	NJDEP/CalEPA	03/13/2013
Copper	NA		NA	NA		D	IRIS	3/13/2013

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

(2) Based on oral cancer slope factor for Dermal exposure, if an absorption factor has been applied

(3) Weight of Evidence Classification defined in List of Acronymns provided at beginning of Appendix B.

* List of Acronymns are provided at beginning of Appendix B.

TABLE 6.2* (Property A).

CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description (3)	Unit Risk : Inhalation CSF	
	Value	Units	Value (1)	Units		Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total) (2)	5.7E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Arsenic (inorganic)	4.3E-03	$(ug/m3)^{-1}$			A	IRIS	03/13/2013
Chromium (VI)	8.4E-02	$(ug/m3)^{-1}$			A	NJDEP/CalEPA	03/13/2013
Copper	NA				D	IRIS	3/13/2013

* List of Acronymns provided at beginning of Appendix B.

(1) Based on IRIS file inhalation cancer slope factor for dust or aerosol inhalation

(2) Based on IRIS recommendation when addressing Inhalation of evaporated congeners

(3) Weight of Evidence Classification Definitions Provided at beginning of Appendix B.

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TABLE 7.1.RME (Property A)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		Cancer Slope Factor/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Reference Dose/Reference Concentration		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 1.2 Feet)	Surface Soil (< 1.2 Feet)	Residence (Property A)	**Ingestion**	Arsenic (inorganic)	23.3	mg/kg	1.5E-05	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.3E-05	0.0002	mg/kg day	3E-04	mg/kg day	0.59
				Chromium (VI) (< 2 yrs.)	23.6	mg/kg	8.6E-06	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	4.3E-05	0.0003	mg/kg day	3E-03	mg/kg day	0.10
				Chromium (VI) (2 to 6 yrs.)	23.6	mg/kg	1.7E-05	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.6E-05	0.0003	mg/kg day	3E-03	mg/kg day	0.10
				Chromium (VI) (6 to < 16 yrs)	23.6	mg/kg	4.6E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	6.9E-06	0.00003	mg/kg day	3E-03	mg/kg day	0.01
				Copper	272.1	mg/kg	3.0E-04	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.003	mg/kg day	4E-02	mg/kg day	0.09
				PCBs	0.2	mg/kg	2.4E-07	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	4.7E-07	0.000003	mg/kg day	2E-05	mg/kg day	0.14
			Exposure Route Total								9.9E-05					1.0
			Dermal	PCBs	0.2	mg/kg	9.2E-08	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	1.8E-07	1.1E-06	mg/kg day	0.00002	mg/kg day	0.05
				Arsenic (inorganic)	23.3	mg/kg	2.1E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.2E-06	2.5E-05	mg/kg day	0.0003	mg/kg day	0.08
			Exposure Route Total								3.4E-06					0.14
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	23.3	mg/kg	1.37E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	5.9E-09	1.59E-08	mg/m3	0.000015	mg/m3	0.001
				Chromium (VI) (<2 yrs)	23.6	mg/kg	4.62E-07	ug/m3	8.4E-01	(ug/m3)$^{-1}$	3.9E-07	1.62E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 yrs)	23.6	mg/kg	9.24E-07	ug/m3	2.5E-01	(ug/m3)$^{-1}$	2.3E-07	1.62E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to <16 yrs)	23.6	mg/kg	2.31E-06	ug/m3	2.5E-01	(ug/m3)$^{-1}$	5.8E-07	1.62E-08	mg/m3	0.0001	mg/m3	0.0002
				PCBs	0.2	mg/kg	1.39E-06	ug/m3	5.7E-04	(ug/m3)$^{-1}$	7.9E-10	1.47E-10	mg/m3	0.00007	mg/m3	0.000002
			Exposure Route Total								1.2E-06					0.002
		Exposure Point Total									1.0E-04					1.2
Exposure Medium Total											1.0E-04					1.2
Surface Soil Total											1.0E-04					1.2
Total							**Total of Child Risks Across All Media ***				**1E-04**	**Total of Child Hazards Across All Media ***				**1**

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TABLE 7.2.RME (Property A)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult > 18 Yrs)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		Cancer Slope Factor/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Reference Dose/Reference Concentration		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 1.2 Feet)	Surface Soil (< 1.2 Feet)	Residence (Property A)	Ingestion	Arsenic (inorganic)	23.3	mg/kg	6.6E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	9.8E-06	0.00002	mg/kg day	3E-04	mg/kg day	0.06
				Chromium (VI)	23.6	mg/kg	6.5E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	3.2E-06	0.00003	mg/kg day	3E-03	mg/kg day	0.01
				Copper	272.1	mg/kg	1.3E-04	mg/kg day	NA	(mg/kg-day)$^{-1}$	NA	0.0004	mg/kg day	4E-02	mg/kg day	0.01
				PCBs	0.2	mg/kg	1.0E-07	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	2.0E-07	0.0000003	mg/kg day	2E-05	mg/kg day	0.01
			Exposure Route Total								1.3E-05					0.1
			Dermal	PCBs	0.2	mg/kg	5.6E-08	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	1.1E-07	0.0000002	mg/kg day	0.00002	mg/kg day	0.01
				Arsenic (inorganic)	23.3	mg/kg	1.3E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.0E-06	0.000004	mg/kg day	0.0003	mg/kg day	0.01
			Exposure Route Total								2.1E-06					0.02
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	23.3	mg/kg	5.46E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	2.3E-08	0.00000002	mg/m3	0.000015	mg/m3	0.001
				Chromium (VI)	23.6	mg/kg	3.23E-06	ug/m3	8.4E-02	(ug/m3)$^{-1}$	2.7E-07	0.00000002	mg/m3	0.0001	mg/m3	0.0002
				PCBs	0.2	mg/kg	5.05E-08	ug/m3	5.7E-04	(ug/m3)$^{-1}$	2.9E-11	0.0000000001	mg/m3	0.00007	mg/m3	0.000002
			Exposure Route Total								3.0E-07					0.001
		Exposure Point Total									1.6E-05					0.12
	Exposure Medium Total										1.6E-05					0.12
Surface Soil Total											1.6E-05					0.12
TOTAL							**Adult Risks Across All Media ***				**2E-05**	**Adult Hazards Across All Media ***				**0.1**

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TABLE 7.3.CTE (Property A)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (<16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		Cancer Slope Factor /Unit Risk		Cancer Risk	Intake/Exposure Concentration		Reference Dose/Reference Concentration		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (0 to 1.2 Feet)	Surface Soil (< 1.2 Feet)	Residence (Property A)	Ingestion	Arsenic (inorganic)	23.3	mg/kg	3.8E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	5.7E-06	0.0001	mg/kg day	3E-04	mg/kg-day	0.30
				Chromium (VI) (< 2 yrs)	23.6	mg/kg	2.2E-06	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	1.1E-05	0.0002	mg/kg day	3E-03	mg/kg-day	0.05
				Chromium (VI) (2 to 6 yrs.)	23.6	mg/kg	2.2E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.2E-06	0.0002	mg/kg day	3E-03	mg/kg-day	0.05
				Chromium (VI) (6 to < 16 yrs.)	23.6	mg/kg	2.3E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.5E-07	0.00002	mg/kg day	3E-03	mg/kg-day	0.01
			Exposure Route Total								2.0E-05					0.4
			Dermal	Arsenic (inorganic)	23.3	mg/kg	2.1E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.2E-07	0.000005	mg/kg day	0.0003	mg/kg day	0.02
			Exposure Route Total								3.2E-07					0.02
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	23.3	mg/kg	6.83E-07	ug/m3	4.3E-03	(ug/m3)$^{-1}$	2.9E-09	0.00000002	mg/m3	0.000015	mg/m3	0.001
				Chromium (VI) (<2 years)	23.6	mg/kg	2.31E-07	ug/m3	8.4E-01	(ug/m3)$^{-1}$	1.9E-07	0.00000002	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 years)	23.6	mg/kg	2.31E-07	ug/m3	2.5E-01	(ug/m3)$^{-1}$	5.8E-08	0.00000002	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to <16 years)	23.6	mg/kg	2.31E-07	ug/m3	2.5E-01	(ug/m3)$^{-1}$	5.8E-08	0.00000002	mg/m3	0.0001	mg/m3	0.0002
			Exposure Route Total								3.1E-07					0.002
		Exposure Point Total									2.1E-05					0.42
	Exposure Medium Total										2.1E-05					0.42
Surface Soil Total											2.1E-05					0.42
TOTAL							**Total of Child Across All Media ***				**2E-05**	**Total of Child Hazards Across All Media ***				**0.4**

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TABLE 7.4. CTE (Property A)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult (> 18 Years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		Cancer Slope Factor /Unit RiskCSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Reference Dose/Reference Concentration		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (0 to 1.2 Feet)	Surface Soil (0 to 1.2 Feet)	Residence (Property A)	Ingestion	Arsenic (inorganic)	23.3	mg/kg	8.2E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.2E-06	0.00001	mg/kg day	3E-04	mg/kg day	0.03
				Chromium (VI)	23.6	mg/kg	1.4E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	6.9E-07	0.00002	mg/kg day	3E-03	mg/kg day	0.01
			Exposure Route Total								1.9E-06					0.04
			Dermal	Arsenic (inorganic)	23.3	mg/kg	4.7E-08	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	7.0E-08	0.0000005	mg/kg day	0.0003	mg/kg day	0.002
			Exposure Route Total								7.0E-08					0.002
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	23.3	mg/kg	1.37E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	5.87E-09	0.00000002	mg/m3	0.000015	mg/m3	0.001
				Chromium (VI)	23.6	mg/kg	1.39E-06	ug/m3	8.4E-02	(ug/m3)$^{-1}$	1.16E-07	0.00000002	mg/m3	0.0001	mg/m3	0.0002
			Exposure Route Total								1.2E-07					0.001
		Exposure Point Total									2.1E-06					0.04
	Exposure Medium Total										2.1E-06					0.04
Surface Soil Total											2.1E-06					0.04
TOTAL							**Adult Risks Across All Media ***				**2E-06**	**Adult Hazards Across All Media ***				**0.04**

TABLE 10.1.RME (Property A).

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child and Adult

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (< 1.2 Feet)	Surface Soil (< 1.2 Feet)	Resident (Child) (Property A)	Arsenic (inorganic)	2.3E-05	5.9E-09	3.2E-06		2.6E-05	Hyperpigmentation	0.59	0.001	0.08	0.2
			Chromium (VI) (< 2)	4.3E-05	3.9E-07			4.4E-05	No Observed Adverse Effect	0.10	0.0002		0.1
			Chromium (VI) (2 to 6)	2.6E-05	2.3E-07			2.6E-05	No Observed Adverse Effect	0.10	0.0002		0.0002
			Chromium (VI) (6 to < 16)	6.9E-06	5.8E-07			7.5E-06	No Observed Adverse Effect	0.01	0.0002		0.01
			Copper	NA					Irritation	0.09			0.1
			PCBs	4.7E-07	7.9E-10	1.8E-07		6.5E-07	Immune system	0.14	0.000002	0.05	0.2
			Chemical Total	9.9E-05	1.2E-06	3.4E-06		1.0E-04		1.0	0.002	0.13	1.2
		Exposure Point Total						1.0E-04					1
	Exposure Medium Total							1.0E-04					1
	Surface Soil (< 1.2 Feet)	Resident (Adult) (Property A)	Arsenic (inorganic)	9.8E-06	2.3E-08	2.0E-06		1.2E-05	Hyperpigmentation	0.06	0.001	0.01	0.07
			Chromium (VI)	3.2E-06	2.7E-07			3.5E-06	No Observed Adverse Effect	0.01	0.0002		0.01
			Copper	NA				NA	Irritation	0.01			0.01
			PCBs	2.0E-07	2.9E-11	1.10E-07		3.1E-07	Immune System	0.01	0.000002	0.01	0.02
			Chemical Total	1.3E-05	2.9E-07	2.1E-06		1.6E-05		0.10	0.001	0.02	0.1
		Exposure Point Total						1.6E-05					0.1
	Exposure Medium Total							1.6E-05					0.1
Medium Total											**Child HI Total ***		1
Total						Adult And Child Risk Total *		1E-04			**Adult HI Total ***		0.1

* Cancer risks and noncancer health hazards are pesented with one significant digit consistent with guidance (USEPA, 1989).

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TABLE 10.2.CTE (Property A)

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (< 1.2 Feet)	Surface Soil (< 1.2 Feet)	Resident (Child) (Property A)	Arsenic (inorganic)	5.7E-06	2.9E-09	3.2E-07		6.1E-06	Hyperpigmentation	0.30	0.001	0.02	0.32
			Chromium (VI) (< 2)	1.1E-05	1.9E-07			1.1E-05	No Observed Adverse Effect Level	0.05	0.0002		0.05
			Chromium (VI) (2 to 6)	3.2E-06	5.8E-08			3.3E-06	No Observed Adverse Effect Level	0.05	0.0002		0.05
			Chromium (VI) (6 to < 16)	3.5E-07	5.80E-08			3.5E-07	No Observed Adverse Effect Level	0.01	0.0002		0.01
			Chemical Total	2.0E-05	3.1E-07	3.2E-07		2.1E-05		0.41	0.002	0.02	0.4
		Exposure Point Total											
	Exposure Medium Total												
	Surface Soil (< 1.2 Feet)	Resident (Adult) (Property A)	Arsenic (inorganic)	1.2E-06	5.9E-09	7.0E-08		1.3E-06	Hyperpigmentation	0.03	0.001	0.002	0.03
			Chromium (VI)	6.9E-07	1.2E-07			8.1E-07	No Observed Adverse Effect Level	0.01	0.0002		0.01
			Chemical Total	1.9E-06	1.2E-07	7.0E-08		2.1E-06		0.04	0.001	0.002	0.04
		Exposure Point Total											
	Exposure Medium Total							2.3E-05					
Medium Total											Child HI Total		0.6
Total					Receptor Risk Total (Child & Adult)			2E-05			Adult HI Total		0.04

TABLE 1.1 (Property B)
SELECTION OF EXPOSURE PATHWAYS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe	Media	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current / Future	Surface Soil (< 0.5 Feet)	Surface Soil (< 0.5 Feet)	Residence (Property B)	Resident	Adult	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
			Residence (Property B)	Resident	Young Child (1 to 6 years of age) and a child from birth to < 16 years for exposures to chemicals with a Mutagenic Mode of Action.	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Dermal Contact	Quantitative	
						Inhalation of Fugitive Dust	Quantitative	
Future	Subsurface Soil	Subsurface Soil	Residence (Property B)	Construction/ Utility Worker	Adult	Ingestion	Qualitative	This pathway is evaluated qualitative based on a lack of data on chemical concentrations at depth.
						Inhalation of Fugitive Dust	Qualitative	
						Dermal Contact	Qualitative	

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TABLE 2.1 * (Property B)

SUMMARY OF OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 0.5 Feet)
Exposure Medium: Surface Soil (< 0.5 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (Cancer/Noncancer) (2)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property B)	7440-38-2	Arsenic (inorganic)	29.3 (N)	30.4 (N)	mg/kg	SS-42	3/3	29.3 (N) - 30.4	30.4 (N)	NA	0.61 (Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	21.5 (EN)	30.6 (EN)	mg/kg	SS-41	3/3	21.5 (EN) - 30.6 (EN)	30.6 (EN)	NA	0.29 (Cancer)			Y	ASL
	7439-92-1	Lead	549 (E)	1,420 (E)	mg/kg	SS-41	5/5	549 (E) - 1,420 (E)	1420 (E)	NA	400			Y	ASL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration based on the lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The screening levels were obtained from the May 2013 Regional Screening Level Tables.

* All acronymns are provided at the beginning of Appendix B.

TABLE 2.2 * (Property B)

DETAILED LIST OF OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 0.5 Feet)
Exposure Medium: Surface Soil (< 0.5 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (Cancer/Noncancer) (2)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property B)	1336-36-3	Total PCBs	0.092 (J)	0.120 (ND)	mg/kg	SS-42	2/2	0.092 - 0.120 (ND)	0.120 (ND)	NA	0.2 (Cancer)			N	BSL
	7440-38-2	Arsenic (inorganic)	29.3 (N)	30.4 (N)	mg/kg	SS-42	3/3	29.3 (N) - 30.4	30.4 (N)	NA	0.61 (Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	21.5 (EN)	30.6 (EN)	mg/kg	SS-41	3/3	21.5 (EN) - 30.6 (EN)	30.6 (EN)	NA	0.29 (Cancer)			Y	ASL
	7440-50-8	Copper	128 (EN)	162 (EN)	mg/kg	SS-41	3/3	128 (EN) - 162 (EN)	162 (N)	NA	310 (Noncancer)			N	BSL
	7439-92-1	Lead	549 (E)	1,420 (E)	mg/kg	SS-41	5/5	549 (E) - 1,420 (E)	1420 (E)	NA	400			Y	ASL
	7440-66-6	Zinc	422 (E)	1300 (E)	mg/kg	SS-41	3/3	422 (E) - 1,300 (E)	1300 (E)	NA	2,300 (Noncancer)			N	BSL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration based on the lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The screening levels were obtained from the May 2013 Regional Screening Level Tables.

* All acronymns are provided at the beginning of Appendix B.

TABLE 3.1.RME * (Property B)

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future

Medium: Soil (< 0.5 Feet)

Exposure Medium: Surface Soil (< 0.5 Feet)

Exposure Point	Chemicals of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale (1)
Surface Soil (< 0.5 Feet)	Arsenic (inorganic)	mg/kg	24.9	Normal and Log Normal at 5% Significant Level	30.4	30.4	mg/kg	Maximum - only 3 distinct values.	ProUCL 4.1
	Chromium (VI)	mg/kg	25.1	Normal and Log Normal at 5% Significant Level	30.6	30.6	mg/kg	Maximum - only 3 distinct values.	ProUCL 4.1
	Lead	mg/kg	829.0	Log Normal at 5% Significant Level but not Normal at 5% Significance Level	1420	829,0	mg/kg	Mean (used consistent with guidance for addressing lead. (95% UCL is 1,176 mg/kg).	ProUCL 4.1

Table 3.2 Data Used in ProUCL Analysis for Property B.

Arsenic	Sample Location	Chromium	Sample Location	Lead	Sample Location
29.3 (N)	SS-41	21.5 (EN)	SS-42	1420 (E)	SS-41
30.4 (N)	SS-42	30.6 (EN)	SS-41	936 (E)	SS-20
15	SB-7	23.1 (E)	SB-7	653 (E)	SS-42
				587 (E)	SB-7
				549 (E)	SS-19
				Lead Average Concentration	
				829	

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Table 3.3 - ProUCL Output for Arsenic

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	200000%

Arsenic

General Statistics			
Number of Valid Observations	3	Number of Distinct Observations	3
Number of Missing Values	1		

Warning: This data set only has 3 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C0 was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Table 3.4 - ProUCL Out for Lead

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	200000%

Lead

General Statistics			
Number of Valid Observations	5	Number of Distinct Observations	5
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	549	Minimum of Log Data	6.308
Maximum	1420	Maximum of Log Data	7.258
Mean	829	Mean of log Data	6.653
Median	653	SD of log Data	0.396
SD	363.5		
Coefficient of Variation	0.439		
Skewness	1.44		

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.832	Shapiro Wilk Test Statistic	0.882
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1176	95% H-UCL	1414
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1458
95% Adjusted-CLT UCL (Chen-1995)	1208	97.5% Chebyshev (MVUE) UCL	1732
95% Modified-t UCL (Johnson-1978)	1193	99% Chebyshev (MVUE) UCL	2271
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.171	Data appear Normal at 5% Significance Level	
Theta Star	261.4		
MLE of Mean	829		
MLE of Standard Deviation	465.5		
nu star	31.71		
Approximate Chi Square Value (.05)	19.84	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	1096
Adjusted Chi Square Value	15.88	95% Jackknife UCL	1176
		95% Standard Bootstrap UCL	1067
Anderson-Darling Test Statistic	0.441	95% Bootstrap-t UCL	2431
Anderson-Darling 5% Critical Value	0.68	95% Hall's Bootstrap UCL	2713
Kolmogorov-Smirnov Test Statistic	0.295	95% Percentile Bootstrap UCL	1092
Kolmogorov-Smirnov 5% Critical Value	0.358	95% BCA Bootstrap UCL	1157
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1538
		97.5% Chebyshev(Mean, Sd) UCL	1844
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2447
95% Approximate Gamma UCL	1325		
95% Adjusted Gamma UCL	1656		
Potential UCL to Use		Use 95% Student's-t UCL	1176

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3.5 - ProUCL Output for Chromium

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	200000%

Chromium

General Statistics			
Number of Valid Observations	3	Number of Distinct Observations	3
Number of Missing Values	1		

Warning: This data set only has 3 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C1 was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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USEPA (2012). Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER 9200.1-113. USEPA, Washington, DC

TABLE 4.1.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	6	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	6	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - FOR CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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USEPA (2012). Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER 9200.1-113. USEPA, Washington, DC

TABLE 4.2.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 years)	4	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (2 years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (4 years)	1460	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.97	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative

References:

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USEPA (2012). Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER 9200.1-113. USEPA, Washington, DC

TABLE 4.3.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	10	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	3650	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 Years)	10	years	EPA1991 and 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION CHEMICALS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

USEPA (1991). Risk assessment guidance for Superfund. Volume I. Human health evaluation manual - Supplemental Guidance: Standard default exposure factors." Office of Emergency and Remedial Response (Washington, D.C.) OSWER Directive 9285.6-03. NTIS PB91-921314, 10 p, March 25, 1991.

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USEPA (2012). Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER 9200.1-113. USEPA, Washington, DC

TABLE 4.4.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA1991	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative

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USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.5 .RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 1991	

References:

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TABLE 4.6. CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1999	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resdent	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA,

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TABLE 4.6.CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (3 years)	1095	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

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TABLE 4.7 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	year	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	year	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative

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USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.7.CTE MMOA (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE -CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specifi	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specifi	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (3 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 2002	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - C *CF
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 2002	
				VF	Ventilation Factor	Chemical specifi	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specifi	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.8 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	Mean of IR	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Speicfic	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	yrs	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.8 CTE MMOA for Child (6 to < 16 Years) (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHILD (6 TO < 16 YEARS) MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (1 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 4.9. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemcial Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

'(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.9 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor (1)	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.10 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soi	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specifi	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specifi	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soi	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specifi	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specifi	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 5.1 (Property B)

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Arsenic (inorganic)	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Hyperpigmentation, keratosis and possible vascular complications	3	IRIS	03/11/13
Chromium (VI)	Chronic	3E-03	mg/kg-day	1E+00	3E-03	mg/kg-day	No Observed Adverse Effect Level (Point of Departure)	300	IRIS	03/11/13

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

TABLE 5.2 (Property B)

NON-CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Arsenic (inorganic)	Chronic	1.5E-05	mg/m3			Development; cardiovascular system; nervous system; lung; skin	Not Listed	California Environmental Protection Agency	03/11/13
Chromium (VI)	Chronic	1E-04	mg/m3			Lactate dehydrogenase in bronchioalveolar lavage fluid	300	IRIS	03/11/13

R2-0014501

TABLE 6.1 (Property B)

CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units	(1)	Value (2)	Units		Source(s)	Date(s) (MM/DD/YYYY)
Arsenic (inorganic)	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A - Known Human Carcinogen	Integrated Risk Information System	03/13/2013
Chromium (VI)	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	5.0E-01	$(mg/kg\text{-}day)^{-1}$	A - Known Human Carcinogen	New Jersey Department of Environmental Protection and California Environmental Protection Agency	03/13/2013

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

(2) Based on oral cancer slope factor for Dermal exposure, if an absorption factor has been applied

Definitions:

CSF Cancer Slope Factor

mg/kg-day milligrams/kilogram-day

TABLE 6.2 (Property B)

CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value (1)	Units		Source(s)	Date(s) (MM/DD/YYYY)
Arsenic (inorganic)	4.3E-03	$(\text{micrograms/cubic meter})^{-1}$			A - Known Human Carcinogen	Integrated Risk Information System	03/13/2013
Chromium (VI)	8.4E-02	$(\text{micrograms/cubic meter})^{-1}$			A - Known Human Carcinogen	New Jersey Department of Environmental Protection Agency / California Environmental Protection Agency	03/13/2013

(1) Based on Integrated Risk Information System (IRIS) file inhalation cancer slope factor for dust or aerosol inhalation

(2) Based on Integrated Risk Information System (IRIS) recommendation when addressing Inhalation of evaporated congeners

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R2-0014503

TABLE 7.1.RME (Property B)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 0.5 Feet)	Surface Soil (< 0.5 Feet)	Residence (Property B)	Ingestion	Arsenic (inorganic)	30.4	mg/kg	2.0E-05	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.0E-05	0.0002	mg/kg day	3E-04	mg/kg day	0.78
				Chromium (VI) (< 2)	30.6	mg/kg	1.1E-05	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	5.6E-05	0.0004	mg/kg day	3E-03	mg/kg day	0.13
				Chromium (VI) (2 to 6)	30.6	mg/kg	2.2E-05	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.4E-05	0.0004	mg/kg day	3E-03	mg/kg day	0.13
				Chromium (VI) (6 to < 16)	30.6	mg/kg	6.0E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	9.0E-06	0.00004	mg/kg day	3E-03	mg/kg day	0.01
			Exp. Route Total								1.3E-04					1.1
			Dermal	Arsenic (inorganic)	30.4	mg/kg	2.8E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	4.2E-06	3.3E-05	mg/kg day	0.0003	mg/kg day	0.1
			Exp. Route Total								4.2E-06					0.1
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	30.4	mg/kg	1.78E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	7.67E-09	2.08E-08	mg/m3	0.00002	mg/m3	0.001
				Chromium (VI) (< 2 years)	30.6	mg/kg	5.99E-07	ug/m3	8.4E-01	(ug/m3)$^{-1}$	5.03E-07	2.10E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 years)	30.6	mg/kg	1.20E-06	ug/m3	2.5E-01	(ug/m3)$^{-1}$	3.02E-07	2.10E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to<16 years)	30.6	mg/kg	2.99E-06	ug/m3	2.5E-01	(ug/m3)$^{-1}$	7.55E-07	2.10E-08	mg/m3	0.0001	mg/m3	0.0002
			Exp. Route Total								1.6E-06					0.002
		Exposure Point Total									1.3E-04					1.16
	Exposure Medium Total										1.3E-04					1.16
Surface Soil Total											1.3E-04					1.16
											1.3E-04					1.16
							Total of Child Risks Across All Media				**1E-04**	**Total of Adult Hazards Across All Media**				**1**

TABLE 7.2.RME (Property B)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident (Property B)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 0.5 Feet)	Surface Soil (< 0.5 Feet)	Residence (Property B)	Ingestion	Arsenic (inorganic)	30.4	mg/kg	8.6E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.3E-05	0.00002	mg/kg day	0.0003	mg/kg day	0.08
				Chromium (VI)	30.6	mg/kg	8.4E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	4.2E-06	0.00004	mg/kg day	0.003	mg/kg day	0.01
			Exp. Route Total								1.7E-05					0.10
			Dermal	Arsenic (inorganic)	30.4	mg/kg	1.7E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.6E-06	0.000005	mg/kg day	0.0003	mg/kg day	0.02
			Exp. Route Total								2.6E-06					0.02
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	30.4	mg/kg	7.14E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	3.1E-08	0.00000002	ug/m3	0.00002	mg/m3	0.001
				Chromium (VI)	30.6	mg/kg	4.19E-06	ug/m3	8.4E-02	(ug/m3)$^{-1}$	3.5E-07	0.00000002	ug/m3	0.0001	mg/m3	0.0002
			Exp. Route Total								3.8E-07					0.002
		Exposure Point Total									2.0E-05					0.12
	Exposure Medium Total										2.0E-05					0.12
Surface Soil Total											2.0E-05					0.12
											2.0E-05					0.12
							Total of Adult Risks Across All Media				2E-05	**Total of Adult Receptor Hazards Across All Media**				**0.1**

TABLE 7.3.CTE (Property B)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 yrs)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence (Property B)	Ingestion	Arsenic (inorganic)	30.4	mg/kg	5.0E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	7.5E-06	0.0001	mg/kg day	3E-04	mg/kg-day	0.39
				Chromium (VI) (1 to < 2)	30.6	mg/kg	2.8E-06	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	1.4E-05	0.0002	mg/kg day	3E-03	mg/kg-day	0.07
				Chromium (VI) (2 to 6)	30.6	mg/kg	2.8E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	4.2E-06	0.0002	mg/kg day	3E-03	mg/kg-day	0.07
				Chromium (VI) (6 to < 16)	30.6	mg/kg	3.0E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	4.5E-07	0.00002	mg/kg day	3E-03	mg/kg-day	0.01
			Exp. Route Total								2.6E-05					0.5
			Dermal	Arsenic (inorganic)	30.4	mg/kg	2.8E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	4.2E-07	6.5E-06	mg/kg day	0.0003	mg/kg day	0.02
			Exp. Route Total								4.2E-07					0.02
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	30.4	mg/kg	8.92E-07	ug/m3	4.3E-03	(ug/m3)$^{-1}$	3.84E-09	2.08E-08	mg/m3	0.000015	mg/m3	0.001
				Chromium (VI) (< 2 years)	30.6	mg/kg	2.99E-07	ug/m3	8.4E-01	(ug/m3)$^{-1}$	2.52E-07	2.10E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 years)	30.6	mg/kg	2.99E-07	ug/m3	2.5E-01	(ug/m3)$^{-1}$	7.55E-08	2.10E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to<16 years)	30.6	mg/kg	2.99E-07	ug/m3	2.5E-01	(ug/m3)$^{-1}$	7.55E-08	2.10E-08	mg/m3	0.0001	mg/m3	0.0002
			Exp. Route Total								4.1E-07					0.002
		Exposure Point Total									2.7E-05					0.55
	Exposure Medium Total										2.7E-05					0.55
Surface Soil Total											2.7E-05					0.55
											2.7E-05					0.55
							Total of Child Risks Across All Media				**3E-05**	**Total of Child Hazards Across All Media**				**0.5**

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TABLE 7.4.CTE (Property B)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident (Property B)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 0.5 Feet)	Surface Soil (< 0.5 Feet)	Residence (Property B)	Ingestion	Arsenic (inorganic)	30.4	mg/kg	1.1E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.6E-06	0.00001	mg/kg day	0.0003	mg/kg day	0.04
				Chromium (VI)	30.6	mg/kg	1.8E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	9.0E-07	0.00002	mg/kg day	0.003	mg/kg day	0.01
			Exp. Route Total								2.5E-06					0.05
			Dermal	Arsenic (inorganic)	30.4	mg/kg	6.1E-08	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	9.2E-08	0.0000007	mg/kg day	0.0003	mg/kg day	0.002
			Exp. Route Total								9.2E-08					0.002
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	30.4	mg/kg	1.78E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	7.7E-09	0.00000002	mg/m3	0.00002	mg/m3	0.001
				Chromium (VI)	30.6	mg/kg	1.80E-06	ug/m3	8.4E-02	(ug/m3)$^{-1}$	1.5E-07	0.00000002	mg/m3	0.0001	mg/m3	0.0002
			Exp. Route Total								1.6E-07					0.002
		Exposure Point Total									2.8E-06					0.05
	Exposure Medium Total										2.8E-06					0.05
Surface Soil Total											2.8E-06					0.05
							Total of Adult Risks Across All Media				**3E-06**	**Total of Adult Hazards Across All Media**				**0.05**

* Results are provided with one significant figure consistent with guidance (USEPA, 1989).

TABLE 10.1.RME (Property B)
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child and Adult

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (Property B)	Surface Soil (Property B)	Resident (Child)	Arsenic (inorganic)	3.0E-05	7.67E-09	4.2E-06		3.4E-05	Hyperpigmentation	0.78	0.001	0.1	0.88
			Chromium (VI) (< 2)	5.6E-05	5.03E-07			5.6E-05	No Observed Adverse Effect Level	0.13	0.0002		0.13
			Chromium (VI) (2 to 6)	3.4E-05	3.02E-07			3.4E-05	No Observed Adverse Effect Level	0.13	0.0002		0.13
			Chromium (VI) (6 to < 16)	9.0E-06	7.55E-07			9.7E-06	No Observed Adverse Effect Level	0.01	0.0002		0.01
		Exposure Point Total		1.3E-04	1.6E-06	4.2E-06		1.3E-04		1.1	0.002	0.1	1.2
		Resident (Adult)	Arsenic	1.3E-05	3.1E-08	2.60E-06		1.5E-05	Hyperpigmentation	0.08	0.001	0.02	0.10
			Chromium (VI)	4.2E-06	3.5E-07			4.6E-06	No Observed Adverse Effect Level	0.01	0.0002		0.01
		Exposure Point Total	Chemical Total	1.7E-05	3.8E-07	2.6E-06		2.0E-05		0.10	0.002	0.02	0.12
Receptor Total											Receptor Total Chid HI		1
Receptor Total					Adult and Child Risk Total			2E-04			Receptor HI Total Adult		0.1

* Results are presented with one significant figure consistent with guidance (USEPA, 1989).

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TABLE 10.2.CTE (Property B)
RISK SUMMARY
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child and Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (Property B)	Surface Soil (Propety B)	Resident (Child)	Arsenic (inorganic)	7.5E-06	3.8E-09	4.2E-07		7.9E-06	Hyperpigmentation	0.39	0.001	0.02	0.4
			Chromium (VI) (< 2)	1.4E-05	2.5E-07			1.4E-05	NOAEL	0.07	0.0002		0.07
			Chromium (VI) (2 to 6)	4.2E-06	7.6E-08			4.3E-06	NOAEL	0.07	0.0002		0.07
			Chromium (VI) (6 to < 16)	4.5E-07	7.6E-08			5.2E-07	NOAEL	0.01	0.0002		0.01
			Chemical Total	2.6E-05	4.0E-07	4.2E-07		2.7E-05		0.5	0.002	0.02	0.5
Surface Soil (Property B)	Surface Soil (Property B)	Resident (Adult)	Arsenic (inroganic)	1.6E-06	7.7E-09	9.0E-08		1.7E-06	Hyperpigmentation	0.04	0.001	0.002	0.04
			Chromium (VI)	9.0E-07	1.5E-07			1.1E-06	NOAEL	0.01	0.0002		0.01
			Chemical Total	2.5E-06	1.6E-07	9.0E-08		2.7E-06		0.05	0.002	0.002	0.05
											Receptor HI Total (Child)		0.5
Receptor Total				Adult + Child Risk Total				3E-05			Receptor HI Total (Adult)		0.05

* Results are presented with one significant figure consistent with guidance (USEPA, 1989).

TABLE 1.1 (Property C)
SELECTION OF EXPOSURE PATHWAYS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe	Media	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface Soil (< 1.6 Feet)	Surface Soil (< 1.6 Feet)	Residence (Property C)	Resident	Adult	Ingestion	Quantitative	The property is zoned residential however, residential structures are not located on the property. This pathway is complete under a future scenario.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
			Residence (Property C)	Resident	Young Child (1 to 6 years of age) and birth to < 16 years for Chemicals Evaluated Based on Mutagenic Mode of Action.	Ingestion	Quantitative	The property is zoned residential however, residential structures are not located on the property. This pathway is complete under a future scenario.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
Future	Subsurface Soil	Subsurface Soil	Residence (Property C)	Construction/ Utility Worker	Adult	Ingestion	Qualitative	This pathway is evaluated qualitative based on a lack of data on chemical concentrations at depth.
						Inhalation of Fugitive Dust	Qualitative	
						Dermal Contact	Qualitative	

TABLE 2.1 * (Property C)

SUMMARY OF OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - FINAL LIST

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Medium: Surface Soil (< 1.6 Feet)
Exposure Medium: Surface Soil (< 1.6 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
								PCBs							
Surface Soil (Property C)	1336-36-3	Total PCBs	0.068 (J)	1.06	mg/kg	SS-37	4/6	0.068 - 1.060	1.06	NA	0.22 (Cancer)			Y	ASL
								Semi-Volatile Organic Compounds							
	56-55-3	Benzo(a)anthracene	1.100 (J)	1.100 (J)	mg/kg	SB-9	1/1	1.100 (J)	1.1 (J)	NA	0.15 (Cancer)			Y	ASL
	50-32-8	Benzo(a)pyrene	1.100 (J)	1.100 (J)	mg/kg	SB-9	1/1	1.100 (J)	1.1 (J)	NA	0.015 (Cancer)			Y	ASL
	205-99-2	Benzo(b)fluoroanthene	1.300 (J)	1.300 (J)	mg/kg	SB-9	1/1	1.300 (J)	1.3 (J)	NA	0.15 (Cancer)			Y	ASL
	53-70-3	Dibenzo(ah)anthracene	0.290 J	0.290 J	mg/kg	SB-9	1/1	0.290 (J)	0.29 J	NA	0.015 (Cancer)			Y	ASL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.730 J	0.730 J	mg/kg	SB-9	1/1	0.730 (J)	0.73 J	NA	0.15 (Cancer)			Y	ASL
								Metals							
	7429-90-5	Aluminum	9,460	9,460	mg/kg	SB-9	1/1	9,460	9,460	NA	7,700 (Noncancer)			Y	ASL
	7440-38-2	Arsenic (inorganic)	7.7 (N)	22.3	mg/kg	SB-11	6/6	7.7 (N) - 22.3	22.3	NA	0.61 (Cancer)			Y	ASL/Known Human
	18540-29-9	Chromium (VI)	16.2 (EN)	262 (E)	mg/kg	SB-10	6/6	16.2 (EN) - 262 (EN)	262 (EN)	NA	0.29 (Cancer)			Y	ASL
	7440-48-4	Cobalt	8.3	8.3	mg/kg	SB-9	1/1	8.3	8.3	NA	2.3 (Noncancer)			Y	ASL
	7440-50-8	Copper	97.2 (EN)	2,240 (EN)	mg/kg	SS-11	6/6	97.2 (EN) - 2,240 (EN)	2,240 (EN)	NA	310 (Noncancer)			Y	ASL
	7439-89-6	Iron	19,400	19,400	mg/kg	SB-9	1/1	19,400	19,400	NA	5,500 (Noncancer)			Y	ASL
	7439-92-1	Lead	603 (E)	1,030 (E)	mg/kg	SS-11	6/6	603 (E) - 1,030 (E)	1,030 (E)	NA	400			Y	ASL
	7439-96-5	Manganese	369	369	mg/kg	SB-9	1/1	369	369	NA	180 (Noncancer)			Y	ASL
	7440-28-0	Thallium (Soluble Salts)	0.68 (ND)	0.68 (ND)	mg/kg	SB-9	1/1	0.68 (ND)	0.68 (ND)	NA	0.078 (Noncancer)			Y	ASL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The screening levels were obtained May 2013 Regional Screening Levels available at: http://www.epa.gov/region9/superfund/prg/.

* List of Acronymns provided at beginning of Appendix B.

TABLE 2.2* (Property C)

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Medium: Surface Soil (< 1.6 Feet)
Exposure Medium: Surface Soil (< 1.6 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
PCBs															
Surface Soil (Property C)	1336-36-3	Total PCBs	0.068 (J)	1.06	mg/kg	SS-37	4/6	0.068 - 1.060	1.06	NA	0.2 (Cancer)			Y	ASL
Semi-Volatile Organic Compounds															
	208-96-8	Acenaphthylene	0.16 (J)	0.16 (J)	mg/kg	SB-9	1/1	0.16 (J)	0.16 (J)	NA	NA			N	No Toxicity Value
	120-12-7	Anthracene	0.23 (J)	0.23 (J)	mg/kg	SB-9	1/1	0.23 (J)	0.23 (J)	NA	1,700 (Noncancer)			N	BSL
	56-55-3	Benzo(a)anthracene	1.100 (J)	1.100 (J)	mg/kg	SB-9	1/1	1.100 (J)	1.1 (J)	NA	0.15 (Cancer)			Y	ASL
	50-32-8	Benzo(a)pyrene	1.100 (J)	1.100 (J)	mg/kg	SB-9	1/1	1.100 (J)	1.1 (J)	NA	0.015 (Cancer)			Y	ASL
	205-99-2	Benzo(b)fluoroanthene	1.300 (J)	1.300 (J)	mg/kg	SB-9	1/1	1.300 (J)	1.3 (J)	NA	0.15 (Cancer)			Y	ASL
	191-24-2	Benzo(ghi)perylene	0.900 J	0.900 J	mg/kg	SB-9	1/1	0.900 (J)	0.9 J	NA	NA			N	No Toxicity Value
	207-08-9	Benzo(k)fluoroanthene	0.480 (J)	0.480 (J)	mg/kg	SB-9	1/1	0.480 (J)	0.48 (J)	NA	1.5 (cancer)			N	BSL
	218-01-9	Chrysene	1.200 (J)	1.200 (J)	mg/kg	SB-9	1/1	1.200 (J)	1.2 (J)	NA	15 (Cancer)			N	BSL
	53-70-3	Dibenzo(ah)anthracene	0.290 J	0.290 J	mg/kg	SB-9	1/1	0.290 (J)	0.29 J	NA	0.015 (Cancer)			Y	ASL
	206-44-0	Fluoroanthene	1.900 J	1.900 J	mg/kg	SB-9	1/1	1.900 (J)	1.9 J	NA	230 (Noncancer)			N	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.730 J	0.730 J	mg/kg	SB-9	1/1	0.730 (J)	0.73 J	NA	0.15 (Cancer)			Y	ASL
	85-01-8	Phenanthrene	1.200 J	1.200 J	mg/kg	SB-9	1/1	1.200 (J)	1.2 J	NA	NA			N	No Toxicity Value
	129-00-0	Pyrene	2.000 J	2.000 J	mg/kg	SB-9	1/1	2.000 (J)	2.0 J	NA	170 (Noncancer)			N	BSL
Metals															
	7429-90-5	Aluminum	9,460	9,460	mg/kg	SB-9	1/1	9,460	9,460	NA	7,700 (Noncancer)			Y	ASL
	7440-36-0	Antimony (metallic)	2.0 (B)	2.0 (B)	mg/kg	SB-9	1/1	2.0 (B)	2.0 (B)	NA	3.1 (Noncancer)			N	BSL
	7440-38-2	Arsenic (inorganic)	7.7 (N)	22.3	mg/kg	SB-11	6/6	7.7 (N) - 22.3	22.3	NA	0.61 (Cancer)			Y	ASL/Known Human
	7440-39-3	Barium	309	309	mg/kg	SB-9	1/1	309	309	NA	15,000 (Noncancer)			N	BSL
	7440-41-7	Beryllium	0.68 B	0.68 B	mg/kg	SB-9	1/1	0.68 B	0.68 B	NA	16 (Noncancer)			N	BSL
	7440-43-9	Cadmium	0.69 B	0.69 B	mg/kg	SB-9	1/1	0.69 B	0.69 B	NA	7 (Noncancer)			N	BSL
	18540-29-9	Chromium (VI)	16.2 (EN)	262 (E)	mg/kg	SB-10	6/6	16.2 (EN) - 262 (EN)	262 (EN)	NA	0.29 (Cancer)			Y	ASL
	7440-48-4	Cobalt	8.3	8.3	mg/kg	SB-9	1/1	8.3	8.3	NA	2.3 (Noncancer)			Y	ASL
	7440-50-8	Copper	97.2 (EN)	2,240 (EN)	mg/kg	SS-11	6/6	97.2 (EN) - 2,240 (EN)	2,240 (EN)	NA	310 (Noncancer)			Y	ASL
	7439-89-6	Iron	19,400	19,400	mg/kg	SB-9	1/1	19,400	19,400	NA	5,500 (Noncancer)			Y	ASL
	7439-92-1	Lead	603 (E)	1,030 (E)	mg/kg	SS-11	6/6	603 (E) - 1,030 (E)	1,030 (E)	NA	400			Y	ASL
	7439-96-5	Manganese	369	369	mg/kg	SB-9	1/1	369	369	NA	180 (Noncancer)			Y	ASL
	7439-97-6	Mercury	0.793	0.793	mg/kg	SB-9	1/1	0.793	0.793	NA	1 (Noncancer)			N	BSL
	7440-02-0	Nickel (Soluble Salts)	22.4	22.4	mg/kg	SB-9	1/1	22.4	22.4	NA	150 (Noncancer)			N	BSL
	7782-49-2	Selenium	2.0 (B)	2.0 (B)	mg/kg	SB-9	1/1	2.0 (B)	2.0 (B)	NA	39 (Noncancer)			N	BSL
	7440-22-4	Silver	0.56 (B)	0.56 (B)	mg/kg	SB-9	1/1	0.56 (B)	0.56 (B)	NA	39 (Noncancer)			N	BSL
	7440-28-0	Thallium (Soluble Salts)	0.68 (ND)	0.68 (ND)	mg/kg	SB-9	1/1	0.68 (ND)	0.68 (ND)	NA	0.078 (Noncancer)			Y	ASL
	7440-62-2	Vanadium and Compounds	27.6	27.6	mg/kg	SB-9	1/1	27.6	27.6	NA	39 (Noncancer)			N	BSL
	7440-66-6	Zinc	500 (E)	2,240 (E)	mg/kg	SB-10	6/6	500 (E) - 2,240 (E)	2,240 (E)	NA	2,300 (Noncancer)			N	BSL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the analysis and they are availabel at: http://www.epa.gov/reg3hwmd/risk/human//rb-concentration_table/Generic_Tables/docs/ressoil_sl_table_run_MAY2013.pdf.

* List of Acronymns provided at beginning of Appendix B.

TABLE 3.1.RME (Property C)

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future

Medium: Surface Soil (< 1.6 Feet)

Exposure Medium: Surface Soil (< 1.6 Feet)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Surface Soil (< 1.6 Feet)	Total PCBs	mg/kg	0.244	Data not normal or log normal at the 5% Significance Level	1.1	1.1	mg/kg	Maximum (calculated value exceeds the maximum concentration)	ProUCL 4.1
	Benzo(a)anthracene	mg/kg	1.1 (J)	NA	1.1 (J)	1.1 (J)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Benzo(a)pyrene	mg/kg	1.1 (J)	NA	1.1 (J)	1.1 (J)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Benzo(b)fluoroanthene	mg/kg	1.3 (J)	NA	1.3 (J)	1.3 (J)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Dibenzo(ah)anthracene	mg/kg	0.29 (J)	NA	0.29 (J)	0.29 (J)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Indeno(1,2,3-cd)pyrene	mg/kg	0.73 (J)	NA	0.73 (J)	0.73(J)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Aluminum	mg/kg	9,460	NA	9,460	9,460	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Arsenic (inorganic)	mg/kg	13.4	Data appear Normal at 5% Significance	22.3	17.8	mg/kg	95% Student's-t UCL	ProUCL 4.1
	Chromium (VI)	mg/kg	32.1	Data not normal or log normal at 5% significance	262 (E)	262 (E)	mg/kg	Statistical values exceeded maximum. Maximum assumed.	ProUCL 4.1
	Cobalt	mg/kg	8.3	NA	8.3	8.3	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Copper	mg/kg	502.4	Data not normal or log normal at the 5% Significance Level	2,240	2,240	mg/kg	Maximum - calculated value exceeds maximum	ProUCL 4.1
	Iron	mg/kg	19,400	NA	19,400	19,400	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Lead	mg/kg	845.5	Data not normal or log normal at 5% significance level.	1,030 (E)	845.5	mg/kg	Mean Value (Consistent with Lead Guidance).;	ProUCL 4.1
	Manganese	mg/kg	369	NA	369	369	mg/kg	Maximum (one Sample)	ProUCL 4.1

(1) Utilized ProUCL Version 4.1

* List of Acronymns provided at beginning of Appendix B.

Table 3.2 - Summary of Data Used in Calculation of Exposure Point Concentrations.

Arsenic	Sample Location	Chromium	Sample Location	Lead	Sample Location	Copper	Sample Location	PCBs	Sample Location
15.5 N	SS-36	20.5 EN	SS-36	603 E	SS-36	125	SB-9	0.07 J	SS-36
8.1 N	SS-37	22.6 EN	SS-37	666 E	SS-37	234 N	SB-10	1.06	SS-37
7.7 N	SS-38	16.2 EN	SS-38	901 E	SS-38	2240 N	SB-11	0.068 J	SS-38
14.4	SB-9	25	SB-9	975	SB-9	108 EN	SS-36	0.11 ND	SB-9
12.1	SB-10	262 E	SB-10	898 E	SB-10	210 EN	SS-37	0.16	SB-10
22.3	SB-11	22.3 E	SB-11	1030 E	SB-11	97.2 EN	SS-38	0.100 ND	SB-11
				Average Lead Concentration 845.5					

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General UCL Statistics for Full Data Sets

User Selected Options			
From File	WorkSheet.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Arsenic

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	7.7	Minimum of Log Data	2.041
Maximum	22.3	Maximum of Log Data	3.105
Mean	13.35	Mean of log Data	2.523
Geometric Mean	12.47	SD of log Data	0.406
Median	13.25		
SD	5.42		
Std. Error of Mean	2.213		
Coefficient of Variation	0.406		
Skewness	0.756		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.927	Shapiro Wilk Test Statistic	0.941
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	17.81	95% H-UCL	21.05
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	22.99
95% Adjusted-CLT UCL (Chen-1995)	17.72	97.5% Chebyshev (MVUE) UCL	27.16
95% Modified-t UCL (Johnson-1978)	17.92	99% Chebyshev (MVUE) UCL	35.36
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.85	Data appear Normal at 5% Significance Level	
Theta Star	3.468		
MLE of Mean	13.35		
MLE of Standard Deviation	6.804		
nu star	46.2		
Approximate Chi Square Value (.05)	31.6	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	16.99
Adjusted Chi Square Value	27.32	95% Jackknife UCL	17.81
		95% Standard Bootstrap UCL	16.7
Anderson-Darling Test Statistic	0.27	95% Bootstrap-t UCL	18.64
Anderson-Darling 5% Critical Value	0.698	95% Hall's Bootstrap UCL	18.48
Kolmogorov-Smirnov Test Statistic	0.205	95% Percentile Bootstrap UCL	16.83
Kolmogorov-Smirnov 5% Critical Value	0.333	95% BCA Bootstrap UCL	17.02
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	22.99
		97.5% Chebyshev(Mean, Sd) UCL	27.17
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	35.37
95% Approximate Gamma UCL (Use when n >= 40)	19.52		
95% Adjusted Gamma UCL (Use when n < 40)	22.58		
Potential UCL to Use		Use 95% Student's-t UCL	17.81

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

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Table 3.4. Output from ProUCL For Chromium (Property C).

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Chromium

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	16.2	Minimum of Log Data	2.785
Maximum	262	Maximum of Log Data	5.568
Mean	61.43	Mean of log Data	3.469
Geometric Mean	32.11	SD of log Data	1.039
Median	22.45		
SD	98.3		
Std. Error of Mean	40.13		
Coefficient of Variation	1.6		
Skewness	2.445		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.526	Shapiro Wilk Test Statistic	0.632
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	142.3	95% H-UCL	399.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	138.1
95% Adjusted-CLT UCL (Chen-1995)	170.2	97.5% Chebyshev (MVUE) UCL	176.6
95% Modified-t UCL (Johnson-1978)	149	99% Chebyshev (MVUE) UCL	252.2
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.562	Data do not follow a Discernable Distribution (0.05)	
Theta Star	109.4		
MLE of Mean	61.43		
MLE of Standard Deviation	81.98		
nu star	6.739		
Approximate Chi Square Value (.05)	2.029	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	127.4
Adjusted Chi Square Value	1.228	95% Jackknife UCL	142.3
		95% Standard Bootstrap UCL	121.8
Anderson-Darling Test Statistic	1.408	95% Bootstrap-t UCL	2369
Anderson-Darling 5% Critical Value	0.717	95% Hall's Bootstrap UCL	1532
Kolmogorov-Smirnov Test Statistic	0.478	95% Percentile Bootstrap UCL	140.5
Kolmogorov-Smirnov 5% Critical Value	0.342	95% BCA Bootstrap UCL	142.7
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	236.4
		97.5% Chebyshev(Mean, Sd) UCL	312.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	460.7
95% Approximate Gamma UCL (Use when n >= 40)	204.1		
95% Adjusted Gamma UCL (Use when n < 40)	337.2		
Potential UCL to Use		Use 95% Hall's Bootstrap UCL	1532

Recommended UCL exceeds the maximum observation
In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General UCL Statistics for Full Data Sets

User Selected Options			
From File	WorkSheet.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Lead

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	603	Minimum of Log Data	6.402
Maximum	1030	Maximum of Log Data	6.937
Mean	845.5	Mean of log Data	6.721
Geometric Mean	829.7	SD of log Data	0.217
Median	899.5		
SD	171.9		
Std. Error of Mean	70.16		
Coefficient of Variation	0.203		
Skewness	-0.666		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.885	Shapiro Wilk Test Statistic	0.864
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	986.9	95% H-UCL	1041
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1173
95% Adjusted-CLT UCL (Chen-1995)	940.5	97.5% Chebyshev (MVUE) UCL	1315
95% Modified-t UCL (Johnson-1978)	983.7	99% Chebyshev (MVUE) UCL	1593
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	13.48	Data appear Normal at 5% Significance Level	
Theta Star	62.74		
MLE of Mean	845.5		
MLE of Standard Deviation	230.3		
nu star	161.7		
Approximate Chi Square Value (.05)	133.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	960.9
Adjusted Chi Square Value	124	95% Jackknife UCL	986.9
		95% Standard Bootstrap UCL	953.6
Anderson-Darling Test Statistic	0.504	95% Bootstrap-t UCL	962.8
Anderson-Darling 5% Critical Value	0.697	95% Hall's Bootstrap UCL	924.8
Kolmogorov-Smirnov Test Statistic	0.314	95% Percentile Bootstrap UCL	946.2
Kolmogorov-Smirnov 5% Critical Value	0.332	95% BCA Bootstrap UCL	937
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1151
		97.5% Chebyshev(Mean, Sd) UCL	1284
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1544
95% Approximate Gamma UCL (Use when n >= 40)	1026		
95% Adjusted Gamma UCL (Use when n < 40)	1103		
Potential UCL to Use		Use 95% Student's-t UCL	986.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

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

Table 3.6. ProUCl Analysis for Copper (Property C).

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Copper

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	97.2	Minimum of Log Data	4.577
Maximum	2240	Maximum of Log Data	7.714
Mean	502.4	Mean of log Data	5.434
Geometric Mean	229.1	SD of log Data	1.173
Median	167.5		
SD	853.1		
Std. Error of Mean	348.3		
Coefficient of Variation	1.698		
Skewness	2.426		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.555	Shapiro Wilk Test Statistic	0.756
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1204	95% H-UCL	5434
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1182
95% Adjusted-CLT UCL (Chen-1995)	1444	97.5% Chebyshev (MVUE) UCL	1524
95% Modified-t UCL (Johnson-1978)	1262	99% Chebyshev (MVUE) UCL	2197
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.492	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1022		
MLE of Mean	502.4		
MLE of Standard Deviation	716.6		
nu star	5.898		
Approximate Chi Square Value (.05)	1.588	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	1075
Adjusted Chi Square Value	0.914	95% Jackknife UCL	1204
		95% Standard Bootstrap UCL	1029
Anderson-Darling Test Statistic	1.052	95% Bootstrap-t UCL	6959
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	7167
Kolmogorov-Smirnov Test Statistic	0.408	95% Percentile Bootstrap UCL	1183
Kolmogorov-Smirnov 5% Critical Value	0.343	95% BCA Bootstrap UCL	1530
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2020
		97.5% Chebyshev(Mean, Sd) UCL	2677
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3968
95% Approximate Gamma UCL (Use when n >= 40)	1866		
95% Adjusted Gamma UCL (Use when n < 40)	3242		
Potential UCL to Use		Use 95% Hall's Bootstrap UCL	7167

Recommended UCL exceeds the maximum observation
In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3.7. ProUCL Output for PCBs (Property C).

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

PCBs

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	0.05	Minimum of Log Data	-2.996
Maximum	1.06	Maximum of Log Data	0.0583
Mean	0.244	Mean of log Data	-2.17
Median	0.069	SD of log Data	1.166
SD	0.402		
Coefficient of Variation	1.648		
Skewness	2.396		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.571	Shapiro Wilk Test Statistic	0.755
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.574	95% H-UCL	2.626
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.584
95% Adjusted-CLT UCL (Chen-1995)	0.685	97.5% Chebyshev (MVUE) UCL	0.753
95% Modified-t UCL (Johnson-1978)	0.601	99% Chebyshev (MVUE) UCL	1.085
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.503	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.484		
MLE of Mean	0.244		
MLE of Standard Deviation	0.344		
nu star	6.041		
Approximate Chi Square Value (.05)	1.661	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	0.514
Adjusted Chi Square Value	0.965	95% Jackknife UCL	0.574
		95% Standard Bootstrap UCL	0.488
Anderson-Darling Test Statistic	1.019	95% Bootstrap-t UCL	8.762
Anderson-Darling 5% Critical Value	0.72	95% Hall's Bootstrap UCL	3.955
Kolmogorov-Smirnov Test Statistic	0.363	95% Percentile Bootstrap UCL	0.559
Kolmogorov-Smirnov 5% Critical Value	0.343	95% BCA Bootstrap UCL	0.58
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.959
		97.5% Chebyshev(Mean, Sd) UCL	1.268
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.876
95% Approximate Gamma UCL	0.887		
95% Adjusted Gamma UCL	1.527		
Potential UCL to Use		Use 95% Hall's Bootstrap UCL	3.955

Recommended UCL exceeds the maximum observation
In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

USEPA (1991). Risk assessment guidance for Superfund. Volume I. Human health evaluation manual - Supplemental Guidance: Standard default exposure factors." Office of Emergency and Remedial Response (Washington, D.C.) OSWER Directive 9285.6-03. NTIS PB91-921314, 10 p, March 25, 1991.

USEPA (2004). Risk assessment guidance for Superfund (RAGS). Vol 1: human health evaluation manual (part E, supplemental guidance for dermal risk assessment). Final. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. EPA/540/R/99/005.

USEPA (2012). Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER 9200.1-113. USEPA, Washington, DC

TABLE 4.1.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	6	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	6	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

USEPA (1991). Risk assessment guidance for Superfund. Volume I. Human health evaluation manual - Supplemental Guidance: Standard default exposure factors." Office of Emergency and Remedial Response (Washington, D.C.) OSWER Directive 9285.6-03. NTIS PB91-921314, 10 p, March 25, 1991.

USEPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Office of Solid Waste and Emergency Response, Washington, D.C. December 2002.

TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - FOR CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.2.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (2 years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (4 years)	1460	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.97	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.3.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	10	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	3650	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 Years)	10	years	EPA1991 and 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION CHEMICALS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.4.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA1991	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.5 .RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 1991	

References:

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TABLE 4.6. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1999	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resdent	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.6.CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (3 years)	1095	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

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TABLE 4.7 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	year	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	year	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.7.CTE MMOA (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE -CHEMICALS WITH MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (3 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 2002	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - C *CF
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 2002	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 4.8 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	Mean of IR	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Speicfic	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	yrs	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.8 CTE MMOA for Child (6 to < 16 Years) (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHILD (6 TO < 16 YEARS) MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (1 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.9. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemcial Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

'(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.9 CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

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TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor (1)	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.10 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor-1016	Chronic	7E-05	mg/kg-day	1E+00	7E-05	mg/kg-day	Developmental (low birth	100	IRIS	03/11/13
Aroclor-1254	Chronic	2E-05	mg/kg-day	1E+00	2E-05	mg/kg-day	immune system	300	IRIS	03/11/13
Benzo(a)anthracene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Benzo(a)pyrene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Benzo(b)fluoroanthene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Dibenzo(a,h)anthracene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Indeno(1,2,3-cd)pyrene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Aluminum	Chronic	1E+00	mg/kg-day	1E+00	N/A	mg/kg-day	Lowest Observed Adverse Effect Level for minimal	100	PPRTV	03/11/13
Arsenic (inorganic)	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Hyperpigmentation, keratosis and possible vascular complications	3	IRIS	03/11/13
Chromium (VI)	Chronic	3E-03	mg/kg-day	1E+00	3E-03	mg/kg-day	No Observed Adverse Effect Level	300	IRIS	03/11/13
Cobalt	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Lowest Observed Adverse Effect Level	3000	PPRTV	03/11/13
Copper	Chronic	4E-02	mg/kg-day	1E+00	4E-02	mg/kg-day	Irritation	(Not Stated)	HEAST	07/01/97
Iron	Chronic	7E-01	mg/kg-day	1E+00	7E-01	mg/kg-day	Lowest Observed Adverse Effect Level	1.5	PPRTV	03/11/13
Manganese	Chronic	1E-01	mg/kg-day	1E+00	1E-01	mg/kg-day	Central Nervous System effects (other effect: Impairment of neurobehavioral function).	1	IRIS	03/11/13

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

TABLE 5.2*

NON-CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor 1254	Chronic	7E-08	mg/m3			immune system	1E+02	Route to Route Extrapolation	9/20/2009
Aroclor 1016	Chronic	2E-07	mg/m3			reduced birthweight	3E+02	Route to Route Extrapolation	9/20/2009
Benzo(a)anthracene		NA				NA			
Benzo(a)pyrene		NA				NA			
Benzo(b)fluoroanthene		NA				NA			
Dibenzo(ah)anthracene		NA				NA			
Indeno(1,2,3-cd)pyrene		NA				NA			
Aluminum	Chronic	5 E-03	mg/m3			Lowest Observed Adverse Effect Level	300	PPRTV	03/11/13
Arsenic (inorganic)	Chronic	1.5E-05	mg/m3			Development; cardiovascular system; nervous system; lung; skin Development; cardiovascular system; nervous system; lung; skin	Not Listed	CalEPA	03/11/13
Chromium (VI)	Chronic	1E-04	mg/m3			Lactate dehydrogenase in bronchioalveolar lavage fluid	300	IRIS	03/11/13
Cobalt	Chronic	6E-06	mg/m3			No Observed Adverse Effect Level	100	PPRTV	03/11/13
Copper	Chronic	NA	mg/m3			NA	NA	IRIS	03/11/13
Iron		NA							
Lead									
Manganese	Chronic	5E-05	mg/m3			Impairment of neurobehavioral function (other effect: Impairment of neurobehavioral function.	1,000	IRIS	03/11/13

* Abbreviations and Definitions provided at beginning of Appendix B.

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TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(a)anthracene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(a)pyrene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(b)fluoroanthene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Dibenzo(ah(anthracene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Indeno(1,2,3-cd)pyrene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Aluminum	NA					inadequate information to assess carcinogenic potential	PPRTV	3/13/2013
Arsenic (inorganic)	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/13/2013
Chromium (VI)	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	5.0E-01	$(mg/kg\text{-}day)^{-1}$	A	NJDEP/CalEPA	03/13/2013
Cobalt	NA							
Copper	NA		NA	NA		D	IRIS	3/13/2013
Iron	NA							
Lead	NA							
Manganese	NA							

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

* Abbreviations and Definitions provided at beginning of Appendix B.

TABLE 6.2*

CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value (1)	Units		Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	5.7E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
PCBs (Total)	1.0E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(a)anthracene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(a)pyrene	1.1-03	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(b)fluoroanthene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Dibenzo(ah)anthracene	1.2E-03	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Indeno(1,2,3-cd)pyrene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Aluminum	NA				inadequate information to assess carcinogenic potential	PPRTV	03/13/2013
Arsenic (inorganic)	4.3E-03	$(ug/m3)^{-1}$			A	IRIS	03/13/2013
Chromium (VI)	8.4E-02	$(ug/m3)^{-1}$			A	NJDEP/CalEPA	03/13/2013
Copper	NA				D	IRIS	3/13/2013
Cobalt	9.0E-03	$(ug/m3)^{-1}$				PPRTV	04/21/09
Iron	NA						
Manganese	NA						

(1) Based on IRIS file inhalation cancer slope factor for dust or aerosol inhalation

* Abbreviations and definitions are provided in Appendix B.

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TABLE 7.1. RME (Property C) - Page 1

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence Property C	Ingestion	Benzo(a)anthracene (< 2 yrs)	1.1	mg/kg	4.0E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	2.9E-06			NA		
				Benzo(a)anthracene (2 to 6 yrs)	1.1	mg/kg	8.0E-07	mg/kg day	2.2	(mg/kg-day)$^{-1}$	1.8E-06			NA		
				Benzo(a)anthracene (6 to <16 yrs)	1.1	mg/kg	2.2E-07	mg/kg day	2.2	(mg/kg-day)$^{-1}$	4.7E-07			NA		
				Benzo(a)pyrene (< 2 yrs)	1.1	mg/kg	4.0E-07	mg/kg day	73	(mg/kg-day)$^{-1}$	2.9E-05			NA		
				Benzo(a)pyrene (2 to 6 yrs)	1.1	mg/kg	8.0E-07	mg/kg day	21.9	(mg/kg-day)$^{-1}$	1.8E-05			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	1.1	mg/kg	2.2E-07	mg/kg day	21.9	(mg/kg-day)$^{-1}$	4.7E-06			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	1.3	mg/kg	4.7E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	3.5E-06			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	1.3	mg/kg	9.5E-07	mg/kg day	2.19	(mg/kg-day)$^{-1}$	2.1E-06			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	1.3	mg/kg	2.5E-07	mg/kg day	2.19	(mg/kg-day)$^{-1}$	5.6E-07			NA		
				Dibenzo(ah)anthracene (< 2 yrs)	0.29	mg/kg	1.1E-07	mg/kg day	73	(mg/kg-day)$^{-1}$	7.7E-06			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	0.29	mg/kg	2.1E-07	mg/kg day	21.9	(mg/kg-day)$^{-1}$	4.6E-06			NA		
				Dibenzo(ah)anthracene (6 to <16 yrs)	0.29	mg/kg	5.7E-08	mg/kg day	21.9	(mg/kg-day)$^{-1}$	1.2E-06			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.73	mg/kg	2.7E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	1.9E-06			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.73	mg/kg	5.3E-07	mg/kg day	2.2	(mg/kg-day)$^{-1}$	1.2E-06			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.73	mg/kg	1.4E-07	mg/kg day	2.2	(mg/kg-day)$^{-1}$	3.1E-07			NA		
				Aluminum	9,460	mg/kg	1.0E-02	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.1	mg/kg day	1	mg/kg day	0.1
				Arsenic (inorganic)	17.8	mg/kg	1.2E-05	mg/kg day	1.5	(mg/kg-day)$^{-1}$	1.8E-05	0.0001	mg/kg day	0.0003	mg/kg day	0.5
				Chromium (VI) (< 2)	262.0	mg/kg	9.6E-05	mg/kg day	5.0	(mg/kg-day)$^{-1}$	4.8E-04	0.003	mg/kg day	0.003	mg/kg day	1.1
				Chromium (VI) (2 to 6)	262.0	mg/kg	1.9E-04	mg/kg day	1.5	(mg/kg-day)$^{-1}$	2.9E-04	0.003	mg/kg day	0.003	mg/kg day	1.1
				Chromium (VI) (6 to < 16)	262.0	mg/kg	5.1E-05	mg/kg day	1.5	(mg/kg-day)$^{-1}$	7.7E-05	0.0004	mg/kg day	0.003	mg/kg day	0.1
				Cobalt	8.3	mg/kg	9.1E-06	mg/kg day	NA			0.0001	mg/kg day	0.0003	mg/kg day	0.4
				Copper	2240	mg/kg						0.03	mg/kg day	0.04	mg/kg day	0.7
				Iron	19400	mg/kg	2.1E-02	mg/kg day	NA			0.2	mg/kg day	0.7	mg/kg day	0.4
				Manganese	369	mg/kg	4.0E-04	mg/kg day	NA			0.005	mg/kg day	0.1	mg/kg day	0.03
				PCBs	1.1	mg/kg	1.2E-06	mg/kg day	2.0	(mg/kg-day)$^{-1}$	2.4E-06	0.000014	mg/kg day	0.00002	mg/kg day	0.70
			Exp. Route Total								9.4E-04					5.1

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TABLE 7.1. RME (Property C) - Page 2
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Table 7.1- Page 2																
Surface Soil	Surface Soil	Residence Property C	Dermal	PCBs	1.1	mg/kg	4.7E-07	mg/kg day	2.0	$(mg/kg\text{-}day)^{-1}$	9.5E-07	0.0000055	mg/kg day	0.00002	mg/kg day	0.28
				Benzo(a)anthracene (< 2 yrs)	1.1	mg/kg	1.5E-07	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	1.1E-06			NA		
				Benzo(a)anthracene (2 to 6 yrs)	1.1	mg/kg	2.9E-07	mg/kg day	2.2	$(mg/kg\text{-}day)^{-1}$	6.4E-07			NA		
				Benzo(a)anthracene (6 to <16 yrs)	1.1	mg/kg	1.1E-07	mg/kg day	2.2	$(mg/kg\text{-}day)^{-1}$	2.4E-07			NA		
				Benzo(a)pyrene (< 2 yrs)	1.1	mg/kg	1.5E-07	mg/kg day	73	$(mg/kg\text{-}day)^{-1}$	1.1E-05			NA		
				Benzo(a)pyrene (2 to 6 yrs)	1.1	mg/kg	2.9E-07	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	6.4E-06			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	1.1	mg/kg	1.1E-07	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	2.4E-06			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	1.3	mg/kg	1.7E-07	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	1.3E-06			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	1.3	mg/kg	3.5E-07	mg/kg day	2.2	$(mg/kg\text{-}day)^{-1}$	7.6E-07			NA		
				Benzo(b)fluoroanthene (6 to <16 yrs)	1.3	mg/kg	1.3E-07	mg/kg day	2.2	$(mg/kg\text{-}day)^{-1}$	2.9E-07			NA		
				Dibenzo(ah)anthracene (< 2 yrs)	0.29	mg/kg	3.9E-08	mg/kg day	73	$(mg/kg\text{-}day)^{-1}$	2.8E-06			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	0.29	mg/kg	7.7E-08	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	1.7E-06			NA		
				Dibenzo(ah)anthracene (6 to < 16 yrs)	0.29	mg/kg	2.9E-08	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	6.4E-07			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.73	mg/kg	9.7E-08	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	7.1E-07			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.73	mg/kg	1.9E-07	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	4.3E-06			NA		
				Indeno(1,2,3-cd)pyrene (6 to <16 yrs)	0.73	mg/kg	7.4E-08	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	1.6E-06			NA		
				Arsenic (inorganic)	17.8	mg/kg	1.6E-06	mg/kg day	1.5	$(mg/kg\text{-}day)^{-1}$	2.5E-06	0.000019	mg/kg day	0.0003	mg/kg day	0.06
			Exp. Route Total								3.9E-05					0.34

TABLE 7.1. RME (Property C) - Page 3
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Table 7.1 - Page 3.																
Surface Soil	Surface Soil	Residence	Inhalation	Benzo(a)anthracene (< 2 yrs)	1.1	mg/kg	2.2E-08	ug/m3	0.001	$(ug/m3)^{-1}$	2.4E-11			NA		
			(Fugitive Dust)	Benzo(a)anthracene (> 2 to 6 yrs)	1.1	mg/kg	4.3E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	1.4E-11			NA		
				Benzo(a)anthracene (6 to < 16 yrs)	1.1	mg/kg	1.1E-07	ug/m3	0.0003	$(ug/m3)^{-1}$	3.6E-11			NA		
				Benzo(a)pyrene (< 2 yrs)	1.1	mg/kg	2.2E-08	ug/m3	0.01	$(ug/m3)^{-1}$	2.4E-10			NA		
				Benzo(a)pyrene (2 to 6 yrs)	1.1	mg/kg	4.3E-08	ug/m3	0.003	$(ug/m3)^{-1}$	1.4E-10			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	1.1	mg/kg	1.1E-07	ug/m3	0.003	$(ug/m3)^{-1}$	3.6E-10			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	1.3	mg/kg	2.5E-08	ug/m3	0.001	$(ug/m3)^{-1}$	2.8E-11			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	1.3	mg/kg	5.1E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	1.7E-11			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	1.3	mg/kg	1.3E-07	ug/m3	0.0003	$(ug/m3)^{-1}$	4.2E-11			NA		
				Dibenzo(ah)anthracene (< 2 yrs)	0.29	mg/kg	5.7E-09	ug/m3	0.01	$(ug/m3)^{-1}$	6.8E-11			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	0.29	mg/kg	1.1E-08	ug/m3	0.004	$(ug/m3)^{-1}$	4.1E-11			NA		
				Dibenzo(ah)anthracene (6 to < 16 yrs)	0.29	mg/kg	2.8E-08	ug/m3	0.004	$(ug/m3)^{-1}$	1.0E-10			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.73	mg/kg	1.4E-08	ug/m3	0.001	$(ug/m3)^{-1}$	1.6E-11			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.73	mg/kg	2.9E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	9.4E-12			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.73	mg/kg	7.1E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	2.4E-11			NA		
				Aluminum	9469	mg/kg	9.3E-04	ug/m3	NA			6.5E-06	mg/m3	0.005	mg/m3	0.001
				Arsenic (inorganic)	17.80	mg/kg	1.0E-06	ug/m3	0.004	$(ug/m3)^{-1}$	4.5E-09	1.2E-08	mg/m3	0.000015	mg/m3	0.001
				Chromium (VI) (< 2 years)	23.6	mg/kg	4.6E-07	ug/m3	0.8	$(ug/m3)^{-1}$	3.9E-07	1.6E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 years)	23.6	mg/kg	9.2E-07	ug/m3	0.3	$(ug/m3)^{-1}$	2.3E-07	1.6E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to <16 years)	23.6	mg/kg	2.3E-06	ug/m3	0.3	$(ug/m3)^{-1}$	5.8E-07	1.6E-08	mg/m3	0.0001	mg/m3	0.0002
				Cobalt	8.3	mg/kg	4.9E-07	ug/m3	0.009	$(ug/m3)^{-1}$	4.4E-09	5.7E-09	mg/m3	0.000006	mg/m3	0.0009
				Manganese	369.0	mg/kg	2.2E-05	ug/m3	NA	$(ug/m3)^{-1}$		2.5E-07	mg/m3	0.00005	mg/m3	0.005
				PCBs	1.10	mg/kg	6.5E-08	ug/m3	0.001	$(ug/m3)^{-1}$	3.7E-11	7.5E-10	mg/m3	0.00000007	mg/m3	0.011
			Exp. Route Total								1.2E-06					0.02
		Exposure Point Total									9.8E-04					5.45
Exposure Medium Total											9.8E-04					5.4
ırface Soil Total											9.8E-04					5.4
							Total of Receptor Risks Across All Media				9.8E-04	Total of Receptor Hazards Across All Media				5.4

TABLE 7.2. RME (Property C)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Surface Soil	Surface Soil	Residence Property C	Ingestion	Benzo(a)anthracene	1.1	mg/kg	3.0E-07	mg/kg day	0.73	$(mg/kg\text{-}day)^{-1}$	2.2E-07			NA		
				Benzo(a)pyrene	1.1	mg/kg	3.0E-07	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	2.2E-06			NA		
				Benzo(b)fluoroanthene	1.3	mg/kg	3.6E-07	mg/kg day	0.73	$(mg/kg\text{-}day)^{-1}$	2.6E-07			NA		
				Dibenzo(ah)anthracene	0.3	mg/kg	7.9E-08	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	5.8E-07			NA		
				Indeno(1,2,3-cd)pyrene	0.7	mg/kg	2.0E-07	mg/kg day	0.73	$(mg/kg\text{-}day)^{-1}$	1.5E-07			NA		
				Aluminum	9460	mg/kg	4.4E-03	mg/kg day				0.01	mg/kg day	1	mg/kg day	0.01
				Arsenic (inorganic)	17.8	mg/kg	5.0E-06	mg/kg day	1.5	$(mg/kg\text{-}day)^{-1}$	7.5E-06	0.00001	mg/kg day	0.0003	mg/kg day	0.05
				Chromium (VI)	262	mg/kg	7.2E-05	mg/kg day	0.5	$(mg/kg\text{-}day)^{-1}$	3.6E-05	0.0004	mg/kg day	0.003	mg/kg day	0.1
				Cobalt	8.3	mg/kg	3.9E-06	mg/kg day	NA			0.00001	mg/kg day	0.0003	mg/kg day	0.04
				Copper	2240	mg/kg						0.00307	mg/kg day	0.0400	mg/kg day	0.08
				Iron	19,400	mg/kg	9.1E-03	mg/kg day	NA			0.03	mg/kg day	0.7	mg/kg day	0.04
				Manganese	369	mg/kg	1.7E-04	mg/kg day	NA			0.0005	mg/kg day	0.14	mg/kg day	0.004
				PCBs	1.1	mg/kg	5.2E-07	mg/kg day	2.0	$(mg/kg\text{-}day)^{-1}$	1.0E-06	0.000002	mg/kg day	0.00002	mg/kg day	0.1
			Exp. Route								4.8E-05					0.4
			Dermal	Benzo(a)anthracene	1.1	mg/kg	1.6E-07	mg/kg day	0.7	$(mg/kg\text{-}day)^{-1}$	1.1E-07					
				Benzo(a)pyrene	1.1	mg/kg	1.6E-07	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	1.1E-06					
				Benzo(b)fluoroanthene	1.3	mg/kg	1.8E-07	mg/kg day	0.73	$(mg/kg\text{-}day)^{-1}$	1.3E-07					
				Dibenzo(ah)anthracene	0.3	mg/kg	4.1E-08	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	3.0E-07					
				Indeno(1,2,3-cd)pyrene	0.7	mg/kg	1.0E-07	mg/kg day	0.7	$(mg/kg\text{-}day)^{-1}$	7.6E-08					
				Arsenic (inorganic)	18	mg/kg	1.0E-06	mg/kg day	1.5	$(mg/kg\text{-}day)^{-1}$	1.5E-06	0.00000	mg/kg day	0.0003	mg/kg day	0.01
				PCBs	1.1	mg/kg	2.9E-07	mg/kg day	2.0	$(mg/kg\text{-}day)^{-1}$	5.8E-07	0.0000008	mg/kg day	0.00002	mg/kg day	0.04
			Exp. Route								3.8E-06					0.05
			Inhalation (Fugitive Dust)	Benzo(a)anthracene	1.1	mg/kg	1.5E-07	ug/m3	0.0001	$(ug/m3)^{-1}$	1.7E-11			NA		
				Benzo(a)pyrene	1.1	mg/kg	1.5E-07	ug/m3	0.001	$(ug/m3)^{-1}$	1.7E-10			NA		
				Benzo(b)fluoroanthene	1.3	mg/kg	1.8E-07	ug/m3	0.0001	$(ug/m3)^{-1}$	2.0E-11			NA		
				Dibenzo(ah)anthracene	0.29	mg/kg	4.0E-08	ug/m3	0.001	$(ug/m3)^{-1}$	4.8E-11			NA		
				Indeno(1,2,3-cd)pyrene	0.73	mg/kg	1.0E-07	ug/m3	0.0001	$(ug/m3)^{-1}$	1.1E-11			NA		
				Aluminum	9460	mg/kg	1.3E-03	ug/m3	NA			0.0000065	mg/m3	0.005	mg/m3	0.001
				Arsenic (inorganic)	18	mg/kg	4.2E-06	ug/m3	0.004	$(ug/m3)^{-1}$	1.8E-08	0.0000000	mg/m3	0.0003	mg/m3	0.00004
				Chromium (VI)	8.3	mg/kg	1.1E-06	ug/m3	0.08	$(ug/m3)^{-1}$	9.6E-08	0.000000006	mg/m3	0.00002	mg/m3	0.0004
				PCBs	1.11	mg/kg	2.6E-07	ug/m3	0.00057	$(ug/m3)^{-1}$	1.5E-10	0.0000000008	mg/m3	0.00007	mg/m3	0.00001
			Exp. Route								1.1E-07					0.002
		Exposure Point Total									5.2E-05					0.5
	Exposure Medium Total										5.2E-05					0.5
Total											5.2E-05					0.5
							Total of Receptor Risks Across All Media				**5.2E-05**	**Total of Receptor Hazards Across All Media**				**0.5**

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TABLE 7.3. CTE (Property C)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Benzo(a)anthracene (< 2 yrs)	1.1	mg/kg	1.0E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	7.3E-07			NA		
				Benzo(a)anthracene (2 to 6 yrs)	1.1	mg/kg	1.0E-07	mg/kg day	2.2	(mg/kg-day)$^{-1}$	2.2E-07			NA		
				Benzo(a)anthracene (6 to <16 yrs)	1.1	mg/kg	1.1E-08	mg/kg day	2.2	(mg/kg-day)$^{-1}$	2.4E-08			NA		
				Benzo(a)pyrene (< 2 yrs)	1.1	mg/kg	1.0E-07	mg/kg day	73	(mg/kg-day)$^{-1}$	7.3E-06			NA		
				Benzo(a)pyrene (2 to 6 yrs)	1.1	mg/kg	1.0E-07	mg/kg day	21.9	(mg/kg-day)$^{-1}$	2.2E-06			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	1.1	mg/kg	1.1E-08	mg/kg day	21.9	(mg/kg-day)$^{-1}$	2.4E-07			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	1.3	mg/kg	1.2E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	8.7E-07			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	1.3	mg/kg	1.2E-07	mg/kg day	2.19	(mg/kg-day)$^{-1}$	2.6E-07			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	1.3	mg/kg	1.3E-08	mg/kg day	2.19	(mg/kg-day)$^{-1}$	2.8E-08			NA		
				Dibenzo(ah)anthracene (< 2 yrs)	0.29	mg/kg	2.6E-08	mg/kg day	73	(mg/kg-day)$^{-1}$	1.9E-06			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	0.29	mg/kg	2.6E-08	mg/kg day	21.9	(mg/kg-day)$^{-1}$	5.8E-07			NA		
				Dibenzo(ah)anthracene (6 to <16 yrs)	0.29	mg/kg	2.8E-09	mg/kg day	21.9	(mg/kg-day)$^{-1}$	6.2E-08			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.73	mg/kg	6.7E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	4.9E-07			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.73	mg/kg	6.7E-08	mg/kg day	2.2	(mg/kg-day)$^{-1}$	1.5E-07			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.73	mg/kg	7.1E-09	mg/kg day	2.2	(mg/kg-day)$^{-1}$	1.6E-08			NA		
				Aluminum	9,460	mg/kg	2.6E-03	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.06	mg/kg day	1	mg/kg day	0.1
				Arsenic (inorganic)	17.8	mg/kg	2.9E-06	mg/kg day	1.5	(mg/kg-day)$^{-1}$	4.4E-06	0.0001	mg/kg day	0.0003	mg/kg day	0.2
				Chromium (VI) (< 2)	262.0	mg/kg	2.4E-05	mg/kg day	5.0	(mg/kg-day)$^{-1}$	1.2E-04	0.002	mg/kg day	0.003	mg/kg day	0.6
				Chromium (VI) (2 to 6)	262.0	mg/kg	2.4E-05	mg/kg day	1.5	(mg/kg-day)$^{-1}$	3.6E-05	0.002	mg/kg day	0.003	mg/kg day	0.6
				Chromium (VI) (6 to < 16)	262.0	mg/kg	2.6E-06	mg/kg day	1.5	(mg/kg-day)$^{-1}$	3.8E-06	0.0004	mg/kg day	0.003	mg/kg day	0.1
				Cobalt	8.3	mg/kg	2.3E-06	mg/kg day	NA			0.0001	mg/kg day	0.0003	mg/kg day	0.2
				Copper	2240	mg/kg						0.0143	mg/kg day	0.04	mg/kg day	0.4
				Iron	19400	mg/kg	5.3E-03	mg/kg day	NA			0.1	mg/kg day	0.7	mg/kg day	0.2
				Manganese	369	mg/kg	1.0E-04	mg/kg day	NA			0.002	mg/kg day	0.1	mg/kg day	0.02
				PCBs	1.10	mg/kg	3.0E-07	mg/kg day	2.0	(mg/kg-day)$^{-1}$	6.0E-07	0.000007	mg/kg day	0.00002	mg/kg day	0.35
			Exp. Route Total								1.8E-04					2.6

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TABLE 7.3. CTE (Property C) - Page 2
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Table 7.3 - Page 2.																
Surface Soil	Surface Soil	Residence Property C	Dermal	PCBs	1.1	mg/kg	4.7E-08	mg/kg day	2.0	$(mg/kg\text{-}day)^{-1}$	9.5E-08	0.0000011	mg/kg day	0.00002	mg/kg day	0.06
				Benzo(a)anthracene (< 2 yrs)	1.1	mg/kg	1.5E-08	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	1.1E-07			NA		
				Benzo(a)anthracene (2 to 6 yrs)	1.1	mg/kg	1.5E-08	mg/kg day	2.2	$(mg/kg\text{-}day)^{-1}$	3.2E-08			NA		
				Benzo(a)anthracene (6 to <16 yrs)	1.1	mg/kg	1.6E-09	mg/kg day	2.2	$(mg/kg\text{-}day)^{-1}$	3.5E-09			NA		
				Benzo(a)pyrene (< 2 yrs)	1.1	mg/kg	1.5E-08	mg/kg day	73	$(mg/kg\text{-}day)^{-1}$	1.1E-06			NA		
				Benzo(a)pyrene (2 to 6 yrs)	1.1	mg/kg	1.5E-08	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	3.2E-07			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	1.1	mg/kg	1.6E-09	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	3.5E-08			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	1.3	mg/kg	1.7E-08	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	1.3E-07			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	1.3	mg/kg	1.7E-08	mg/kg day	2.2	$(mg/kg\text{-}day)^{-1}$	3.8E-08			NA		
				Benzo(b)fluoroanthene (6 to <16 yrs)	1.3	mg/kg	1.9E-09	mg/kg day	2.2	$(mg/kg\text{-}day)^{-1}$	4.1E-09			NA		
				Dibenzo(ah)anthracene (< 2 yrs)	0.29	mg/kg	3.9E-09	mg/kg day	73	$(mg/kg\text{-}day)^{-1}$	2.8E-07			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	0.29	mg/kg	3.9E-09	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	8.4E-08			NA		
				Dibenzo(ah)anthracene (6 to < 16 yrs)	0.29	mg/kg	1.6E-09	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	3.5E-08			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.73	mg/kg	9.7E-09	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	7.1E-08			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.73	mg/kg	9.7E-09	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	2.1E-07			NA		
				Indeno(1,2,3-cd)pyrene (6 to <16 yrs)	0.73	mg/kg	1.6E-09	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	3.5E-08			NA		
				Arsenic (inorganic)	17.8	mg/kg	3.3E-07	mg/kg day	1.5	$(mg/kg\text{-}day)^{-1}$	4.9E-07	0.000004	mg/kg day	0.0003	mg/kg day	0.01
			Exp. Route Total								3.0E-06					0.07

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TABLE 7.3. CTE (Property C) - Page 3
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Table 7.3 - Continued.																
		Residence	Inhalation	Benzo(a)anthracene (< 2 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.001	$(ug/m3)^{-1}$	1.2E-11			NA		
			(Fugitive Dust)	Benzo(a)anthracene (> 2 to 6 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	3.6E-12			NA		
				Benzo(a)anthracene (6 to < 16 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	3.6E-12			NA		
				Benzo(a)pyrene (< 2 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.01	$(ug/m3)^{-1}$	1.2E-10			NA		
				Benzo(a)pyrene (2 to 6 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.003	$(ug/m3)^{-1}$	3.7E-11			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.003	$(ug/m3)^{-1}$	3.6E-11			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	1.3	mg/kg	1.3E-08	ug/m3	0.001	$(ug/m3)^{-1}$	1.4E-11			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	1.3	mg/kg	1.3E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	4.2E-12			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	1.3	mg/kg	1.3E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	4.2E-12			NA		
				Dibenzo(ah)anthracene (< 2 yrs)	0.29	mg/kg	2.8E-09	ug/m3	0.01	$(ug/m3)^{-1}$	3.4E-11			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	0.29	mg/kg	2.9E-09	ug/m3	0.004	$(ug/m3)^{-1}$	1.1E-11			NA		
				Dibenzo(ah)anthracene (6 to < 16 yrs)	0.29	mg/kg	2.8E-09	ug/m3	0.004	$(ug/m3)^{-1}$	1.0E-11			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.73	mg/kg	7.1E-09	ug/m3	0.001	$(ug/m3)^{-1}$	7.9E-12			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.73	mg/kg	7.1E-09	ug/m3	0.0003	$(ug/m3)^{-1}$	2.4E-12			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.73	mg/kg	7.1E-09	ug/m3	0.0003	$(ug/m3)^{-1}$	2.4E-12			NA		
				Aluminum	9460	mg/kg	9.3E-05	ug/m3	NA			6.5E-06	mg/m3	0.005	mg/m3	0.001
				Arsenic (inorganic)	17.80	mg/kg	5.2E-07	ug/m3	0.004	$(ug/m3)^{-1}$	2.2E-09	1.2E-08	mg/m3	0.000015	mg/m3	0.001
				Chromium (VI) (< 2 years)	23.6	mg/kg	2.3E-07	ug/m3	0.8	$(ug/m3)^{-1}$	1.9E-07	1.6E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 years)	23.6	mg/kg	2.3E-07	ug/m3	0.8	$(ug/m3)^{-1}$	1.9E-07	1.6E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to <16 years)	23.6	mg/kg	2.3E-07	ug/m3	0.8	$(ug/m3)^{-1}$	1.9E-07	1.6E-08	mg/m3	0.0001	mg/m3	0.0002
				Cobalt	8.3	mg/kg	2.4E-07	ug/m3	0.009	$(ug/m3)^{-1}$	2.2E-09	5.7E-09	mg/m3	0.000006	mg/m3	0.0009
				Manganese	369.0	mg/kg	1.1E-05	ug/m3	NA	$(ug/m3)^{-1}$		2.5E-07	mg/m3	0.00005	mg/m3	0.005
				PCBs	1.10	mg/kg	3.3E-08	ug/m3	0.001	$(ug/m3)^{-1}$	1.9E-11	7.5E-10	mg/m3	0.00000007	mg/m3	0.011
			Exp. Route Total								5.9E-07					0.02
		Exposure Point Total									1.8E-04					2.7
Exposure Medium Total											1.8E-04					2.7
urface Soil Total											1.8E-04					2.7
							Total of Receptor Risks Across All Media				**1.8E-04**	**Total of Receptor Hazards Across All Media**				**2.7**

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TABLE 7.4. CTE (Property C)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence (Property C)	Ingestion	Benzo(a)anthracene	1.1	mg/kg	6.5E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	4.7E-08			NA		
				Benzo(a)pyrene	1.1	mg/kg	6.5E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	4.7E-07			NA		
				Benzo(b)fluoroanthene	1.3	mg/kg	7.6E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	5.6E-08			NA		
				Dibenzo(ah)anthracene	0.3	mg/kg	1.7E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	1.2E-07			NA		
				Indeno(1,2,3-cd)pyrene	0.7	mg/kg	4.3E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	3.1E-08			NA		
				Aluminum	9460.0	mg/kg	5.6E-04					0.006	mg/kg day	1	mg/kg day	0.01
				Arsenic (inorganic)	17.8	mg/kg	6.3E-07	mg/kg day	1.5	(mg/kg-day)$^{-1}$	9.4E-07	0.00001	mg/kg day	0.0003	mg/kg day	0.02
				Chromium (VI)	262	mg/kg	1.5E-05	mg/kg day	0.5	(mg/kg-day)$^{-1}$	7.7E-06	0.0002	mg/kg day	0.003	mg/kg day	0.06
				Cobalt	8.3	mg/kg	4.9E-07	mg/kg day	NA			0.00001	mg/kg day	0.0003	mg/kg day	0.02
				Copper	2240	mg/kg						0.002	mg/kg day	0.04	mg/kg day	0.04
				Iron	19,400	mg/kg	1.1E-03	mg/kg day	NA			0.01	mg/kg day	0.7	mg/kg day	0.02
				Manganese	369	mg/kg	2.2E-05	mg/kg day	NA			0.0003	mg/kg day	0.14	mg/kg day	0.002
				PCBs	1.1	mg/kg	6.5E-08	mg/kg day	2.0	(mg/kg-day)$^{-1}$	1.3E-07	0.000001	mg/kg day	0.00002	mg/kg day	0.04
			Exp. Route Total								9.5E-06					0.21
			Dermal	Benzo(a)anthracene	1.1	mg/kg	9.6E-09	mg/kg day	0.7	(mg/kg-day)$^{-1}$	7.0E-09					
				Benzo(a)pyrene	1.1	mg/kg	9.6E-09	mg/kg day	7.3	(mg/kg-day)$^{-1}$	7.0E-08					
				Benzo(b)fluoroanthene	1.3	mg/kg	1.1E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	8.3E-09					
				Dibenzo(ah)anthracene	0.3	mg/kg	2.5E-09	mg/kg day	7.3	(mg/kg-day)$^{-1}$	1.8E-08					
				Indeno(1,2,3-cd)pyrene	0.7	mg/kg	6.4E-09	mg/kg day	0.7	(mg/kg-day)$^{-1}$	4.6E-09					
				Arsenic (inorganic)	17.8	mg/kg	3.6E-08	mg/kg day	1.5	(mg/kg-day)$^{-1}$	5.4E-08	4.2E-07	mg/kg day	0.0003	mg/kg day	0.001
				PCBs	1.1	mg/kg	1.0E-08	mg/kg day	2.0	(mg/kg-day)$^{-1}$	2.1E-08	1.2E-07	mg/kg day	0.00002	mg/kg day	0.01
			Exp. Route Total								1.8E-07					0.01
			Inhalation (Fugitive Dust)	Benzo(a)anthracene	1.1	mg/kg	6.5E-08	ug/m3	0.0001	(ug/m3)$^{-1}$	7.1E-12			NA		
				Benzo(a)pyrene	1.1	mg/kg	6.5E-08	ug/m3	0.001	(ug/m3)$^{-1}$	7.1E-11			NA		
				Benzo(b)fluoroanthene	1.3	mg/kg	7.6E-08	ug/m3	0.0001	(ug/m3)$^{-1}$	8.4E-12			NA		
				Dibenzo(ah)anthracene	0.29	mg/kg	1.7E-08	ug/m3	0.001	(ug/m3)$^{-1}$	2.0E-11			NA		
				Indeno(1,2,3-cd)pyrene	0.73	mg/kg	4.3E-08	ug/m3	0.0001	(ug/m3)$^{-1}$	4.7E-12			NA		
				Aluminum	9460	mg/kg	5.6E-04	ug/m3				0.00000009	mg/m3	0.0050	mg/m3	0.00002
				Arsenic (inorganic)	17.8	mg/kg	1.0E-06	ug/m3	0.004	(ug/m3)$^{-1}$	4.5E-09	0.000000000	mg/m3	0.0003	mg/m3	0.000001
				Chromium (VI)	8.3	mg/kg	4.9E-07	ug/m3	0.08	(ug/m3)$^{-1}$	4.1E-08	0.00000000008	mg/m3	0.00002	mg/m3	0.000005
				PCBs	1.11	mg/kg	6.5E-08	ug/m3	0.4	(ug/m3)$^{-1}$	2.6E-08	0.00000000001	mg/m3	0.00007	mg/m3	0.0000002
			Exp. Route Total								7.2E-08					0.00002
		Exposure Point Total									9.7E-06					0.2
	Exposure Medium Total										9.7E-06					0.2
Total											9.7E-06					0.2
							Total of Receptor Risks Across All Media				**9.7E-06**	**Total of Receptor Hazards Across All Media**				**0.2**

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TABLE 10.1.RME - Property A (Page 1)
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Resident (child) (Property C)	Benzo(a)anthracene (< 2 yrs)	2.9E-06	2.4E-11	1.1E-06		4.0E-06					
			Benzo(a)anthracene (2 to 6 yrs)	1.8E-06	1.4E-11	6.4E-07		2.4E-06					
			Benzo(a)anthracene (6 to <16 yrs)	4.7E-07	3.6E-11	2.4E-07		7.1E-07					
			Benzo(a)pyrene (< 2 yrs)	2.9E-05	2.4E-10	1.1E-05		4.0E-05					
			Benzo(a)pyrene (2 to 6 yrs)	1.8E-05	1.4E-10	6.4E-06		2.4E-05					
			Benzo(a)pyrene (6 to < 16 yrs)	4.7E-06	3.6E-10	2.4E-06		7.1E-06					
			Benzo(b)fluoroanthene (< 2 yrs)	3.5E-06	2.8E-11	1.3E-06		4.8E-06					
			Benzo(b)fluoroanthene (2 to 6 yrs)	2.1E-06	1.7E-11	7.6E-07		2.8E-06					
			Benzo(b)fluoroanthene (6 to < 16 yrs)	5.6E-07	4.2E-11	2.9E-07		8.5E-07					
			Dibenzo(ah)anthracene (< 2 yrs)	7.7E-06	6.8E-11	2.8E-06		1.1E-05					
			Dibenzo(ah)anthracene (2 to 6 yrs)	4.6E-06	4.1E-11	1.7E-06		6.3E-06					
			Dibenzo(ah)anthracene (6 to <16 yrs)	1.2E-06	1.0E-10	6.4E-07		1.9E-06					
			Indeno(1,2,3-cd)pyrene (< 2 yrs)	1.9E-06	1.6E-11	7.1E-07		2.7E-06					
			Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	1.2E-06	9.4E-12	4.3E-06		5.5E-06					
			Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	3.1E-07	2.4E-11	1.6E-06		1.9E-06					
			Aluminum						neurotoxicity	0.1	0.001		0.1
			Arsenic (inorganic)	1.8E-05	4.5E-09	2.5E-06		2.0E-05	Hyperpigmentation	0.5	0.001	0.06	0.6
			Chromium (VI) (< 2)	4.8E-04	3.9E-07			4.8E-04	NOAEL	1.1	0.0002		1.1
			Chromium (VI) (2 to 6)	2.9E-04	2.3E-07			2.9E-04	NOAEL	1.1	0.0002		1.1
			Chromium (VI) (6 to < 16)	7.7E-05	5.8E-07			7.7E-05	NOAEL	0.1	0.0002		0.1
			Copper						Irritation	0.7			0.7
			Cobalt		4.4E-09			4.4E-09	LOAEL	0.4	0.0009		0.4
			Iron						LOAEL	0.4			0.4
			Manganese						CNS Effects	0.03	0.005		0.04
			PCBs	2.4E-06	3.7E-11	9.5E-07		3.4E-06	Immune	0.7	0.011	0.28	0.99
		Exposure Point Total		9.4E-04	1.2E-06	4E-05		1E-03		5.1	0.01	0.3	5.4
	Exposure Medium Total												
Medium Total													
Receptor Total						Child Risk Total		1E-03			Child HI Total		5.4

HI (Irritation)	0.7
HI (NOAEL)	2.3
HI (Immune System)	1
HI (LOAEL)	0.8
HI (Hyperpigmentation	0.6

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TABLE 10.1.RME - Property C (Page 2)

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Resident (adult) (Property C)	Benzo(a)anthracene	2.2E-07	1.7E-11	1.1E-07		3.3E-07					
			Benzo(a)pyrene	2.2E-06	1.70E-10	1.1E-06		3.3E-06					
			Benzo(b)fluoroanthene	2.6E-07	2.00E-11	1.3E-07		3.9E-07					
			Dibenzo(ah)anthracene	5.8E-07	4.80E-11	3.0E-07		8.8E-07					
			Indeno(1,2,3-cd)pyrene	1.5E-07	1.10E-11	7.6E-08		2.2E-07					
			Aluminum						neurotoxicity	0.01	0.001		0.01
			Arsenic (inorganic)	7.5E-06	1.8E-08	1.5E-06		9.0E-06	Hyperpigmentation	0.05	0.0006		0.05
			Chromium (VI)	3.6E-05	9.6E-08			3.6E-05	NOAEL	0.1	0.0004	0.01	0.1
			Cobalt						LOAEL	0.04			0.04
			Copper						Irritation	0.08			0.08
			Iron						LOAEL	0.04			0.04
			Manganese						CNS Effects	0.004			0.004
			PCBs	1.0E-06	1.5E-10	5.8E-07		1.6E-06	Immune	0.1	0.00001	0.04	0.1
		Exposure Point Total		5E-05	1E-07	4E-06		5.2E-05		0.4	0.002	0.05	0.5
	Exposure Medium Total						Adult Risk total	5.2E-05				Adult HI Total	0.5
Medium Total													
Receptor Total							Child Risk Total	9.8E-04				Child HI Total	5.4
Total Adult and Child							Total (Adult and Child)	1E-03					

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TABLE 10.2.- Property C - CTE

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Resident (child) Property C	Benzo(a)anthracene (< 2 yrs)	7.3E-07	1.2E-11	1.1E-07		8.4E-07					
			Benzo(a)anthracene (2 to 6 yrs)	2.2E-07	3.6E-12	3.2E-08		2.5E-07					
			Benzo(a)anthracene (6 to <16 yrs)	2.4E-08	3.6E-12	3.5E-09		2.8E-08					
			Benzo(a)pyrene (< 2 yrs)	7.3E-06	1.2E-10	1.1E-06		8.4E-06					
			Benzo(a)pyrene (2 to 6 yrs)	2.2E-06	3.7E-11	3.2E-07		2.5E-06					
			Benzo(a)pyrene (6 to < 16 yrs)	2.4E-07	3.6E-11	3.5E-08		2.8E-07					
			Benzo(b)fluoroanthene (< 2 yrs)	8.7E-07	1.4E-11	1.3E-07		1.0E-06					
			Benzo(b)fluoroanthene (2 to 6 yrs)	2.6E-07	4.2E-12	3.8E-08		3.0E-07					
			Benzo(b)fluoroanthene (6 to < 16 yrs)	2.8E-08	4.2E-12	4.1E-09		3.2E-08					
			Dibenzo(ah)anthracene (< 2 yrs)	1.9E-06	3.4E-11	2.8E-07		2.2E-06					
			Dibenzo(ah)anthracene (2 to 6 yrs)	5.8E-07	1.1E-11	8.4E-08		6.6E-07					
			Dibenzo(ah)anthracene (6 to <16 yrs)	6.2E-08	1.0E-11	3.5E-08		9.7E-08					
			Indeno(1,2,3-cd)pyrene (< 2 yrs)	4.9E-07	7.9E-12	7.1E-08		5.6E-07					
			Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	1.5E-07	2.4E-12	2.1E-07		3.6E-07					
			Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	1.6E-08	2.4E-12	3.5E-08		5.1E-08					
			Aluminum						LOAEL for minimal neurotoxicity	0.1	0.001		0.1
			Arsenic (inorganic)	4.4E-06	2.9E-09	4.90E-07		4.9E-06	Hyperpigmentation	0.2	0.001	0.01	0.2
			Chromium (VI) (1 to < 2)	1.2E-04	1.9E-07			1.2E-04	NOAEL	0.6	0.0002		0.6
			Chromium (VI) (2 to 6)	3.6E-05	1.9E-07			3.6E-05	NOAEL	0.6	0.0002		0.6
			Chromium (VI) (6 to < 16)	3.8E-06	1.9E-07			4.0E-06	NOAEL	0.1	0.0002		0.1
			Cobalt		2.2E-09			2.2E-09	LOAEL	0.2	0.0009		0.2
			Copper						Irritation	0.4			0.4
			Iron						LOAEL	0.2			0.2
			Manganese						CNS effects (other effect: Impairment of neurobehavioral function.)	0.02	0.005		0.03
			PCBs	6.0E-07	1.9E-11	9.5E-08		7.0E-07	Immune system	0.35	0.01	0.06	0.42
		Exposure Point Total		1.8E-04	5.9E-07	3.1E-06		1.8E-04		2.4	0.02	0.07	2.9
	Exposure Medium Total												
Medium Total													
Receptor Total							Receptor Risk Total	2E-04				Child Receptor HI Total	3

HI (Irritation)	0.4
HI (NOAEL)	1.3
HI (LOAEL)	0.3
HI (Immune System)	0.4
HI (Hyperpigmentation)	0.2

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TABLE 10.2.CTE - Property C (Page 2)

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (Property C)	Surface Soil	Resident (Adult) Property C	Benzo(a)anthracene	4.7E-08	7.1E-12	7.0E-09		5.4E-08					
			Benzo(a)pyrene	4.7E-07	7.1E-11	7.0E-08		5.4E-07					
			Benzo(b)fluoroanthene	5.6E-08	8,4E-12	8.3E-09		6.4E-08					
			Dibenzo(ah)anthracene	1.2E-07	2.0E-11	1.8E-08		1.4E-07					
			Indeno(1,2,3-cd)pyrene	3.1E-08	4.7E-12	4.6E-09		3.6E-08					
			Aluminum						LOAEL for minimal neurotoxicity	0.01	0.00002		0.01
			Arsenic (inorganic)	9.4E-07	4.5E-09	5.40E-08		1.0E-06	Hyperpigmentation	0.02	0.000001	0.02	0.04
			Chromium (VI)	7.7E-06	4.1E-08			7.7E-06	NOAEL	0.06	0.000005		0.06
			Cobalt						LOAEL	0.02			0.02
			Copper						Irritation	0.04			0.04
			Iron						LOAEL	0.02			0.02
			Manganese						CNS effects (other effect: Impairment of neurobehavioral function.)	0.002			0.002
			PCBs	1.3E-07	2.6E-08	2.1E-08		1.8E-07	Immune	0.04	0.0000002	0.01	0.05
		Exposure Point Total		9.5E-06	7.2E-08	1.8E-07		9.7E-06		0.2	0.00003	0.03	0.2
	Exposure Medium Total			Adult - Receptor Risk				9.7E-06					0.2
Medium Total				Child - Receptor Risk				1.8E-04	Child - HI				3
Receptor Total (Adult and Child)				Adult and Child - Receptor Risk Total				2E-04	Adult HI Total				0.3

TABLE 1.1 (Property D)
SELECTION OF EXPOSURE PATHWAYS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe	Media	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current /Future	Soil (< 1.6 Feet)	Surface Soil (< 1.6 Feet)	Residence (Property D)	Resident	Adult	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
			Residence (Property D)	Resident	Young Child (1 to < 16 years of age)	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Dermal Contact	Quantitative	
						Inhalation of Fugitive Dust	Quantitative	
Future	Subsurface Soil	Subsurface Soil	Residence (Property D)	Construction/ Utility Worker	Adult	Ingestion	Qualitative	This pathway is evaluated qualitative based on a lack of data on chemical concentrations at depth.
						Dermal Contact	Qualitative	

TABLE 2.1 (Property D)

SUMMARY OF OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 1.6 Feet)
Exposure Medium: Surface Soil (< 1.6 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property D)	1336-36-3	Total PCBs	0.044 (J)	0.740	mg/kg	SS-44	2/3	0.044 - 0.740	0.740	NA	0.2 (Cancer)			Y	ASL
	7440-38-2	Arsenic (inorganic)	5	15.4 (N)	mg/kg	SS-44	3/3	5 - 15.4 (N)	15.4 (N)	NA	0.61(Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	13.7 (E)	25.6 (EN)	mg/kg	SS-44	3/3	13.7 (E) - 25.6 (EN)	25.6 (EN)	NA	0.29 (Cancer)			Y	ASL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Levels were used in the selection of Chemicals of Potential Concern and are available at: http://www.epa.gov/reg3hwmd/risk/human//rb-concentration_table/Generic_Tables/docs/ressoil_sl_table_run_MAY2013.pdf.

TABLE 2.2 (Property D)

FULL ANALYSIS OF OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 1.6 Feet)
Exposure Medium: Surface Soil (< 1.6 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property	1336-36-3	Total PCBs	0.044 (J)	0.740	mg/kg	SS-44	2/3	0.044 - 0.740	0.740	NA	0.2 (Cancer)			Y	ASL
	7440-38-2	Arsenic (inorganic)	5	15.4 (N)	mg/kg	SS-44	3/3	5 - 15.4 (N)	15.4 (N)	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	13.7 (E)	25.6 (EN)	mg/kg	SS-44	3/3	13.7 (E) - 25.6 (EN)	25.6 (EN)	NA	0.29 (Cancer)			Y	ASL
	7440-50-8	Copper	85.6	202 (EN)	mg/kg	SS-44	3/3	85.6 - 202 (EN)	202 (EN)	NA	310 (Noncancer)			N	BSL
	7439-92-1	Lead	200 (E)	344 (E)	mg/kg	SS-44	4/4	200 (E) - 344 (E)	344 (E)	NA	400			N	BSL
	7440-66-6	Zinc	254 (E)	1,020 (E)	mg/kg	SS-44	3/3	254 (E) - 1,020 (E)	1,020 (E)	NA	2,300 (Noncancer)			N	BSL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Levels were used in the selection of Chemicals of Potential Concern and are available at: http://www.epa.gov/reg3hwmd/risk/human//rb-concentration_table/Generic_Tables/docs/ressoil_sl_table_run_MAY2013.pdf.

TABLE 3.1.RME (Property D)

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future

Medium: Soil (< 1.6 Feet)

Exposure Medium: Soil (< 1.6 Feet)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Surface Soil (< 1.6 Feetl	Total PCBs	mg/kg	0.29	N/A	0.740	0.740	mg/kg	Maximum (three samples)	ProUCL 4.1
	Arsenic (inorganic)	mg/kg	9.93	N/A	22.3	15.4 (N)	mg/kg	Maximum (three samples)	ProUCL 4.1
	Chromium (VI)	mg/kg	19.87	N/A	25.6 (EN)	25.6 (EN)	mg/kg	Maximum (three samples)	ProUCL 4.1

(1) Utilized ProUCL Version 4.1

Table 3.2. Summary of Data and Sample Locations
Property D

PCBs	Sample Locations	Arsenic	Sample Locations	Chromium	Sample Locations	Lead	Sample Locations
0.74	SS-44	15.4 (N)	SS-44	25.6 (EN)	SS-44	227 (E)	SS-18
0.150 (ND)	SB-14	5	SB-14	13.7 (E)	SB-14	344 (E)	SS-44
0.044 (J)	SB-14	9.4	SB-14	20.3 (E)	SB-14	200	SB-14
						245	SB-14
						222.5	Average Lead Concentration

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.1.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	6	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	6	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - FOR CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.2.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (2 years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (4 years)	1460	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.97	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.3.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	10	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	3650	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 Years)	10	years	EPA1991 and 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION CHEMICALS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.4.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA1991	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.5 .RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 1991	

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TABLE 4.6. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1999	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resdent	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.6.CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (3 years)	1095	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

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TABLE 4.7 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	year	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	year	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.7.CTE MMOA (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE -CHEMICALS WITH MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (3 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 2002	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - C *CF
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 2002	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.8 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	Mean of IR	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Speicfic	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	yrs	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.8 CTE MMOA for Child (6 to < 16 Years) (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHILD (6 TO < 16 YEARS) MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (1 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.9. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemcial Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

'(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.9 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor (1)	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.10 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor-1016	Chronic	7E-05	mg/kg-day	1E+00	7E-05	mg/kg-day	Reduced birth weight	100	IRIS	03/11/13
Aroclor-1254	Chronic	2E-05	mg/kg-day	1E+00	2E-05	mg/kg-day	immune system	300	IRIS	03/11/13
Arsenic (inorganic)	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Hyperpigmentation, keratosis and possible vascular complications	3	IRIS	03/11/13
Chromium (VI)	Chronic	3E-03	mg/kg-day	1E+00	3E-03	mg/kg-day	No Observed Adverse Effect level	300	IRIS	03/11/13

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor 1254	Chronic	7E-08	mg/m3			immune system	1E+02	Route to Route Extrapolation	9/20/2009
Aroclor 1016	Chronic	2E-07	mg/m3			reduced birthweight	3E+02	Route to Route Extrapolation	9/20/2009
Arsenic (inorganic)	Chronic	1.5E-05	mg/m3			Development; cardiovascular system; nervous system; lung; skin	Not Listed	CalEPA	03/11/13
Chromium (VI)	Chronic	1E-04	mg/m3			Lactate dehydrogenase in bronchioalveolar lavage fluid	300	IRIS	03/11/13

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units	(1)	Value (2)	Units		Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Arsenic (inorganic)	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/13/2013
Chromium (VI)	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	5.0E-01	$(mg/kg\text{-}day)^{-1}$	A	NJDEP/CalEPA	03/13/2013

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

(2) Based on oral cancer slope factor for Dermal exposure, if an absorption factor has been applied

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value (1)	Units		Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	5.7E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
PCBs (Total)	1.0E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Arsenic (inorganic)	4.3E-03	$(ug/m3)^{-1}$			A	IRIS	03/13/2013
Chromium (VI)	8.4E-02	$(ug/m3)^{-1}$			A	NJDEP/CalEPA	03/13/2013

(1) Based on IRIS file inhalation cancer slope factor for dust or aerosol inhalation

(2) Based on IRIS recommendation when addressing Inhalation of evaporated congeners

TABLE 7.1.RME (Property D)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Reference Dose / Reference Concentration		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 1.6 Feet)	Surface Soil (< 1.6 Feet)	Residence (Property D)	Ingestion	Arsenic (inorganic)	15.4	mg/kg	1.0E-05	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-05	0.0001	mg/kg day	3E-04	mg/kg day	0.39
				Chromium (VI) (< 2)	25.6	mg/kg	9.4E-06	mg/kg day	5.0E+00	$(mg/kg\text{-}day)^{-1}$	4.7E-05	0.0003	mg/kg day	3E-03	mg/kg day	0.11
				Chromium (VI) (2 to 6)	25.6	mg/kg	1.9E-05	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-05	0.0003	mg/kg day	3E-03	mg/kg day	0.11
				Chromium (VI) (6 to < 16)	25.6	mg/kg	5.0E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.5E-06	0.00004	mg/kg day	3E-03	mg/kg day	0.01
				PCBs	0.74	mg/kg	8.1E-07	mg/kg day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-06	0.000009	mg/kg day	2E-05	mg/kg day	0.47
			Exp. Route Total								9.9E-05					1.1
			Dermal	PCBs	0.74	mg/kg	3.2E-07	mg/kg day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.4E-07	3.7E-06	mg/kg day	0.00002	mg/kg day	0.19
				Arsenic (inorganic)	15.4	mg/kg	1.4E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-06	1.7E-05	mg/kg day	0.0003	mg/kg day	0.06
			Exp. Route Total								2.8E-06					0.24
			Inhalation	Arsenic (inorganic)	15.4	mg/kg	9.0E-07	ug/m3	4.3E-03	$(ug/m3)^{-1}$	3.9E-09	1.1E-08	mg/m3	0.000015	mg/m3	0.0007
				Chromium (VI) (< 2 years)	25.6	mg/kg	5.0E-07	ug/m3	8.4E-01	$(ug/m3)^{-1}$	4.2E-07	1.8E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 years)	25.6	mg/kg	1.0E-06	ug/m3	2.5E-01	$(ug/m3)^{-1}$	2.5E-07	1.8E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to < 16 years)	25.6	mg/kg	2.5E-06	ug/m3	2.5E-01	$(ug/m3)^{-1}$	6.3E-07	1.8E-08	mg/m3	0.0001	mg/m3	0.0002
				PCBs	0.74	mg/kg	4.3E-08	ug/m3	5.7E-04	$(ug/m3)^{-1}$	2.5E-11	5.1E-10	mg/m3	0.00007	mg/m3	0.00001
			Exp. Route Total								1.3E-06					0.001
		Exposure Point Total									1.0E-04					1.3
	Exposure Medium Total										1.0E-04					1.3
Surface Soil Total											1.0E-04					1.3
											1.0E-04					1.3
							Total of Receptor Risks to Child Across All Media				**1.0E-04**	**Total of Receptor Hazards to Child Across All Media**				**1.3**

TABLE 7.2.RME (Property D)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 1.6 Feet)	Surface Soil (< 1,6 Feet)	Residence (Property D)	Ingestion	Arsenic (inorganic)	15.40	mg/kg	4.3E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	6.5E-06	0.000013	mg/kg day	3E-04	mg/kg day	0.04
				Chromium (VI)	25.60	mg/kg	7.0E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	3.5E-06	0.000035	mg/kg day	3E-03	mg/kg day	0.01
				PCBs	0.74	mg/kg	3.5E-07	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	7.0E-07	0.00000203	mg/kg day	2E-05	mg/kg day	0.10
			Exp. Route Total								1.1E-05					0.16
			Dermal	Arsenic (inorganic)	15.40	mg/kg	3.8E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	5.6E-06	1.1E-05	mg/kg day	3E-04	mg/kg day	0.036
				PCBs	0.74	mg/kg	1.9E-07	mg/kg day	2	(mg/kg-day)$^{-1}$	3.9E-07	5.7E-07	mg/kg day	0.00002	mg/kg day	0.028
			Exp. Route Total								6.0E-06					0.06
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	15.40	mg/kg	3.6E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	1.6E-08	1.1E-08	mg/m3	0.00002	mg/m3	0.001
				Chromium (VI)	25.60	mg/kg	3.5E-06	ug/m3	8.4E-02	(ug/m3)$^{-1}$	2.9E-07	1.8E-08	mg/m3	0.00002	mg/m3	0.001
				PCBs	0.74	mg/kg	1.7E-07	ug/m3	5.7E-04	(ug/m3)$^{-1}$	9.9E-11	5.1E-10	mg/m3	0.00007	mg/m3	0.000007
			Exp. Route Total								3.1E-07					0.002
		Exposure Point Total									1.7E-05					0.2
	Exposure Medium Total										1.7E-05					0.2
Surface Soil Total											1.7E-05					0.2
											1.7E-05					0.2
							Total of Receptor Risks to Adults Across All Media				**1.7E-05**	**Total of Receptor Hazards to Adults Across All Media**				**0.2**

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TABLE 7.3.CTE (Property D)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				Hazard Quotient
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Reference Dose/ Reference Concentrations		
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 1.6 Feet)	Surface Soil (< 1.6 Feet)	Residence	Ingestion	Arsenic (inorganic)	15.4	mg/kg	2.5E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.8E-06	0.0001	mg/kg day	3E-04	mg/kg day	0.20
				Chromium (VI) (1 to < 2)	25.6	mg/kg	2.3E-06	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	1.2E-05	0.0002	mg/kg day	3E-03	mg/kg day	0.05
				Chromium (VI) (2 to 6)	25.6	mg/kg	2.3E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.5E-06	0.0002	mg/kg day	3E-03	mg/kg day	0.05
				Chromium (VI) (6 to < 16	25.6	mg/kg	2.5E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.8E-07	0.00002	mg/kg day	3E-03	mg/kg day	0.01
				PCBs	0.74	mg/kg	2.0E-07	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	4.1E-07	0.000005	mg/kg day	2E-05	mg/kg day	0.24
			Exp. Route Total								2.0E-05					0.55
			Dermal	PCBs	0.74	mg/kg	3.2E-08	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	6.4E-08	7.4E-07	mg/kg day	0.00002	mg/kg day	0.04
				Arsenic (inorganic)	15.40	mg/kg	1.4E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.1E-07	3.3E-06	mg/kg day	0.0003	mg/kg day	0.01
			Exp. Route Total								2.8E-07					0.05
				Arsenic (inorganic)	15.4	mg/kg	4.5E-07	ug/m3	4.3E-03	(ug/m3)$^{-1}$	1.9E-09	1.1E-08	mg/m3	0.000015	mg/m3	0.0007
				Chromium (VI) (1 to < 2 years)	25.6	mg/kg	2.5E-07	ug/m3	8.4E-01	(ug/m3)$^{-1}$	2.1E-07	1.8E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 years)	25.6	mg/kg	2.5E-07	ug/m3	2.5E-01	(ug/m3)$^{-1}$	6.3E-08	1.8E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to < 16 years)	25.6	mg/kg	2.5E-07	ug/m3	2.5E-01	(ug/m3)$^{-1}$	6.3E-08	1.8E-08	mg/m3	0.0001	mg/m3	0.0002
				PCBs	0.74	mg/kg	2.2E-08	ug/m3	5.7E-04	(ug/m3)$^{-1}$	1.3E-11	5.1E-10	mg/m3	0.00007	mg/m3	0.00001
			Exp. Route Total								3.4E-07					0.001
		Exposure Point Total									2.0E-05					0.6
	Exposure Medium Total										2.0E-05					0.6
Surface Soil Total											2.0E-05					0.6
											2.0E-05					0.6
							Total of Child Risks Across All Media				**2.0E-05**	**Total of Child Hazards Across All Media**				**0.6**

TABLE 7.4. CTE (Property D)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 1.6 Feet)	Surface Soil (< 1.6 Feet)	Residence	Ingestion	Arsenic (inorganic)	15.40	mg/kg	5.4E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	8.1E-07	0.000006	mg/kg day	3E-04	mg/kg day	0.02
				Chromium (VI)	25.60	mg/kg	1.5E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	7.5E-07	0.000018	mg/kg day	3E-03	mg/kg day	0.01
				PCBs	0.74	mg/kg	4.3E-08	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	8.7E-08	0.000002	mg/kg day	2E-05	mg/kg day	0.12
			Exp. Route Total								1.7E-06					0.15
			Dermal	Arsenic (inorganic)	15.40	mg/kg	1.3E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.0E-07	1.6E-06	mg/kg day	3E-04	mg/kg day	0.01
				PCBs	0.74	mg/kg	6.9E-09	mg/kg day	2	(mg/kg-day)$^{-1}$	1.4E-08	8.1E-08	mg/kg day	0.00002	mg/kg day	0.004
			Exp. Route Total								2.1E-07					0.01
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	15.40	mg/kg	9.0E-07	ug/m3	4.3E-03	(ug/m3)$^{-1}$	3.9E-09	1.1E-08	mg/m3	0.00002	mg/m3	0.0007
				Chromium (VI)	25.60	mg/kg	1.5E-06	ug/m3	8.4E-01	(ug/m3)$^{-1}$	1.3E-06	1.8E-08	mg/m3	0.0001	mg/m3	0.0002
				PCBs	0.74	mg/kg	4.3E-08	ug/m3	5.7E-04	(ug/m3)$^{-1}$	2.5E-11	5.1E-10	mg/m3	0.00007	mg/m3	0.000007
			Exp. Route Total								1.3E-06					0.001
		Exposure Point Total									3.1E-06					0.16
	Exposure Medium Total										3.1E-06					0.16
Surface Soil Total											3.1E-06					0.16
											3.1E-06					0.16
							Total of Receptor Risks Across All Media				**3.1E-06**	**Total of Receptor Hazards Across All Media**				**0.2**

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TABLE 10.1.RME (Property D)

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Residence (Child)	Arsenic (inorganic)	1.5E-05	3.9E-09	2.1E-06		1.7E-05	Hyperpigmentation, keratosis and possible vascular complications	0.39	0.0007	0.06	0.45
		Property D	Chromium (VI) (< 2)	4.7E-05	4.2E-07			4.7E-05	No Observed Adverse Effect Level	0.11	0.0002		0.11
			Chromium (VI) (2 to 6)	2.8E-05	2.5E-07			2.8E-05	No Observed Adverse Effect Level	0.11	0.0002		0.11
			Chromium (VI) (6 to < 16	7.5E-06	6.3E-07			8.1E-06	No Observed Adverse Effect Level	0.01	0.0002		0.01
			PCBs	1.6E-06	2.5E-11	6.4E-07		2.3E-06	immune system	0.47	0.00001	0.19	0.66
			Chemical Total	9.9E-05	1.3E-06	2.8E-06		1.0E-04		1.1	0.001	0.25	1.3
		Exposure Point Total											
	Exposure Medium Total												
		Residence (Adult)	Arsenic (inorganic)	6.5E-06	1.6E-08	5.6E-06		1.2E-05	Hyperpigmentation, keratosis and possible vascular complications	0.04	0.001	0.04	0.08
		Property D	Chromium (VI)	3.5E-06	2.9E-07			3.8E-06	No Observed Adverse Effect Level	0.01	0.001		0.01
			PCBs	7.0E-07	9.9E-11	3.9E-07		1.1E-06	immune system	0.10	0.000007	0.03	0.13
			Chemical Total	1.1E-05	3.1E-07	6.0E-06		1.7E-05		0.15	0.002	0.06	0.2
		Exposure Point Total											
	Exposure Medium Total										Total HI for Child		1
Medium Total								1E-04			Total HI for Adult		0.2

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TABLE 10.2.CTE (Property D)

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New YorkSite Name

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (< 1.6 Feet)	Surface Soil (< 1.6 Feet)	Residence (Child) (Property D)	Arsenic (inorganic)	3.8E-06	1.9E-09	2.1E-07		4.0E-06	Hyperpigmentation, keratosis and possible vascular complications	0.20	0.0007	0.01	0.21
			Chromium (VI) (1 to < 2)	1.2E-05	2.1E-07			1.2E-05	No Observed Adverse Effect Level	0.05	0.0002		0.05
			Chromium (VI) (2 to 6)	3.5E-06	6.3E-08			3.6E-06	No Observed Adverse Effect Level	0.05	0.0002		0.05
			Chromium (VI) (6 to < 16	3.8E-07	6.3E-08			4.4E-07	No Observed Adverse Effect Level	0.01	0.0002		0.01
			PCBs	4.1E-07	1.3E-11	6.4E-08		4.7E-07	immune system	0.24	0.00001	0.04	0.28
			Chemical Total	2.0E-05	3.4E-07	2.7E-07		2.0E-05		0.5	0.001	0.05	0.6
		Exposure Point Total											
	Exposure Medium Total												
	Surface Soil (< 1.6 Feet)	Residence (Adult) (Property D)	Arsenic (inorganic)	8.1E-07	3.9E-09	2.0E-07		1.0E-06	Hyperpigmentation, keratosis and possible vascular complications	0.02	0.0007	0.01	0.03
			Chromium (VI)	7.5E-07	1.3E-06			2.1E-06	No Observed Adverse Effect Level	0.01	0.0002		0.01
			PCBs	8.7E-08	2,5E-11	1.4E-08		1.0E-07	immune system	0.12	0.000007	0.004	0.12
			Chemical Total	1.7E-06	1.3E-06	2.1E-07		3.2E-06		0.15	0.001	0.01	0.16
		Exposure Point Total											
	Exposure Medium Total								Total HI for Child				0.6
Medium Total				Total Cancer Risks (Adult and Child)				3E-05	Total HI for Adult				0.2

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TABLE 1.1 (Property E)
SELECTION OF EXPOSURE PATHWAYS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe	Media	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current / Future	Soil (<1.7 Feet)	Surface Soil (< 1.7 Feet)	Residence (Property E)	Resident	Adult	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
			Residence (Property E)	Resident	Child (< 16 years)	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Dermal Contact	Quantitative	
						Inhalation of Fugitive Dust	Quantitative	
Future	Subsurface Soil	Subsurface Soil (4 to 4.3 Feet)	Residence (Property E)	Construction/ Utility Worker	Adult	Ingestion	Qualitative	This pathway is evaluated based on a single sample sB-13.
						Inhalation of Fugitive Dust	Qualitative	
						Dermal Contact	Qualitative	

TABLE 2.1 (Property E)
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
List of Potential Chemicals of Concern for Metals
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (0 to 1.7 Feet)
Exposure Medium: Surface Soil (0 to 1.7 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property E)	1336-36-3	Total PCBs	0.039 (J)	4.160	mg/kg	SB-13	5/5	0.039 (J) - 4.16	4.16	NA	0.2 (Cancer)			Y	ASL
	7429-90-5	Aluminum	11400	11,400	mg/kg	SB-13	1/1	11,400	11,400	NA	7700 (Noncancer)			Y	ASL
	7440-38-2	Arsenic (inorganic)	5.3	20.8	mg/kg	SB-13	5/5	5.3 - 20.8	20.8	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
	7440-43-9	Cadmium	7.9 (N)	7.9 (N)	mg/kg	SB-13	1/1	7.9 (N)	7.9 (N)	NA	7 (Noncancer)			Y	ASL
	18540-29-9	Chromium (VI)	7.7 (E)	157	mg/kg	SB-13	5/5	7.7 (E) - 157	157	NA	0.29 (Cancer)			Y	ASL
	7440-48-4	Cobalt	19.0 (E)	19.0 (E)	mg/kg	SB-13	1/1	19.0 (E)	19 (E)	NA	2.3 (Noncancer)			Y	ASL
	7440-50-8	Copper	20.7	603	mg/kg	SB-13	5/5	20.7 - 603	603	NA	310 (Noncancer)			Y	ASL
	7439-89-6	Iron	71 (E)	103,000 (N)	mg/kg	SB-13	2/2	71 (E) - 103,000 (N)	103,000 (N)	NA	5500 (Noncancer)			Y	ASL
	7439-92-1	Lead	38.7 (E)	672 (N)	mg/kg	SB-13	5/5	38.7 (E) - 672 (N)	672 (N)	NA	400			Y	ASL
	7439-96-5	Manganese	522 (N)	522 (N)	mg/kg	SB-13	1/1	522 (N)	522 (N)	NA	180 (Noncancer)			Y	ASL
	7439-97-6	Mercury	1.9 (N)	1.9 (N)	mg/kg	SB-13	1/1	1.9 (N)	1.9 (N)	NA	1 (Noncancer)			Y	ASL
	7440-28-0	Thallium (Soluble Salts)	2.1	2.1	mg/kg	SB-13	1/1	2.1	2.1	NA	0.078 (Noncancer)			Y	ASL
	7440-66-6	Zinc	225 (E)	2140 (N)	mg/kg	SB-13	5/5	225 (E) - 2140 (E)	2140 (E)	NA	2,300 (Noncancer)			Y	ASL

(1) Maximum Concentration of all samples used as screening level.
(2) Screening Toxicity Concentration is based on the lowest concentration in soil associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the assessment (http://www.epa.gov/region9/superfund/prg/).

Definitions
ARAR - Applicable or Relevant and Appropriate Requirements
TBC - To Be Considered Values
COPC - Chemical of Potential Concern
ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantitation limit.
(E) Estimated concentration due to the presence of intereference (inorganics)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

TABLE 2.2 (Property E)
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
List of PAHs of Potential Concern
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil (< 1.7 Feet)
Exposure Medium: Soil (< 1.7 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property E)	56-55-3	Benzo(a)anthracene	0.87 (J)	0.87 (J)	mg/kg	SB-13	1/1	0.87 (J)		NA	0.15 (Cancer)			Y	ASL
	50-32-8	Benzo(a)pyrene	0.87 (J)	0.87 (J)	mg/kg	SB-13	1/1	0.87 (J)		NA	0.015 (Cancer)			Y	ASL
	205-99-2	Benzo(b)fluoroanthene	0.99 (J)	0.99 (J)	mg/kg	SB-13	1/1	0.99 (J)		NA	0.15 (Cancer)			Y	ASL
	91-20-3	dibenzofuran	12 (ND)	12 (ND)	mg/kg	SB-13	1/1	12 (ND)		NA	7.8 (Noncancer)			Y	ASL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.54 (J)	0.54 (J)	mg/kg	SB-13	1/1	0.54 (J)		NA	0.15 (Cancer)			Y	ASL
	91-20-3	Naphthalene	12 (ND)	12 (ND)	mg/kg	SB-13	1/1	12 (ND)		NA	3.6 (Cancer)			Y	ASL

(1) Maximum Concentration of all samples used as screening level.
(2) Screening Toxicity Concentration is based on the lowest concentration in soil associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the assessment (http://www.epa.gov/region9/superfund/prg/).

Definitions
ARAR - Applicable or Relevant and Appropriate Requirements
TBC - To Be Considered Values
COPC - Chemical of Potential Concern
ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantitation limit.
(E) Estimated concentration due to the presence of intereference (inorganics)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

TABLE 2.3 (Property E)
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Supporting Information for Selection of Metals of Potetnail Concern
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (0 to 1.7 Feet)
Exposure Medium: Surface Soil (0 to 1.7 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property E)	1336-36-3	Total PCBs	0.039 (J)	4.16	mg/kg	SB-13	5/5	0.039 (J) - 4.16	4.16	NA	0.2 (Cancer)			Y	ASL
	7429-90-5	Aluminum	11400	11,400	mg/kg	SB-13	1/1	11,400	11,400	NA	7700 (Noncancer)			Y	ASL
	7440-36-0	Antimony (metallic)	2.1 (BN)	2.1 (BN)	mg/kg	SB-13	1/1	2.1 (BN)	2.1 (BN)	NA	31 (Noncancer)			N	BSL
	7440-38-2	Arsenic (inorganic)	5.3	20.8	mg/kg	SB-13	5/5	5.3 - 20.8	20.8	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
	7440-39-3	Barium	163	163	mg/kg	SB-13	1/1	163	163	NA	15000 (Noncancer)			N	BSL
	7440-41-7	Beryllium	0.65 (B)	0.65 (B)	mg/kg	SB-13	1/1	0.65 (B)	0.65 (B)	NA	16 (Noncancer)			N	BSL
	7440-43-9	Cadmium	7.9 (N)	7.9 (N)	mg/kg	SB-13	1/1	7.9 (N)	7.9 (N)	NA	7 (Noncancer)			Y	ASL
	18540-29-9	Chromium (VI)	7.7 (E)	157	mg/kg	SB-13	5/5	7.7 (E) - 157	157	NA	0.29 (Cancer)			Y	ASL
	7440-48-4	Cobalt	19.0 (E)	19.0 (E)	mg/kg	SB-13	1/1	19.0 (E)	19 (E)	NA	2.3 (Noncancer)			Y	ASL
	7440-50-8	Copper	20.7	603	mg/kg	SB-13	5/5	20.7 - 603	603	NA	310 (Noncancer)			Y	ASL
	7439-89-6	Iron	71 (E)	103,000 (N)	mg/kg	SB-13	2/2	71 (E) - 103,000 (N)	103,000 (N)	NA	5500 (Noncancer)			Y	ASL
	7439-92-1	Lead	38.7 (E)	672 (N)	mg/kg	SB-13	5/5	38.7 (E) - 672 (N)	672 (N)	NA	400			Y	ASL
	7439-96-5	Manganese	522 (N)	522 (N)	mg/kg	SB-13	1/1	522 (N)	522 (N)	NA	180 (Noncancer)			Y	ASL
	7439-97-6	Mercury	1.9 (N)	1.9 (N)	mg/kg	SB-13	1/1	1.9 (N)	1.9 (N)	NA	1 (Noncancer)			Y	ASL
	7440-02-0	Nickel (Soluble Salts)	76.8 (E)	76.8 (E)	mg/kg	SB-13	1/1	76.8 (E)	76.8 (E)	NA	150 (Noncancer)			N	BSL
	7782-49-2	Selenium	6.9	6.9	mg/kg	SB-13	1/1	6.9	6.9	NA	39 (Noncancer0			N	BSL
	7440-22-4	Silver	2.9 (N)	2.9 (N)	mg/kg	SB-13	1/1	2.9 (N)	2.9 (N)	NA	39 (Noncancer)			N	BSL
	7440-28-0	Thallium (Soluble Salts)	2.1	2.1	mg/kg	SB-13	1/1	2.1	2.1	NA	0.078 (Noncancer)			Y	ASL
	NA	Vanadium and Compounds	21.6 (E)	21.6 (E)	mg/kg	SB-13	1/1	21.6 (E)	21.6 (E)	NA	39 (Noncancer)			N	BSL
	7440-66-6	Zinc	225 (E)	2140 (N)	mg/kg	SB-13	5/5	225 (E) - 2140 (E)	2140 (E)	NA	2,300 (Noncancer)			N	BSL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on the lowest concentration in soil associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the assessment (http://www.epa.gov/region9/superfund/prg/).

Definitions

ARAR - Applicable or Relevant and Appropriate Requirements
TBC - To Be Considered Values
COPC - Chemical of Potential Concern
ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantitation limit.
(E) Estimated concentration due to the presence of intereference (inorganics)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

TABLE 2.2 (Property E)
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
List of Supporting Analysis for Selection of PAHS of Potential Concern
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil (< 1.7 Feet)
Exposure Medium: Soil (< 1.7 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property E)	91-57-6	2-Methylnaphthalene	12 (ND)	12 (ND)	mg/kg	SB-13	1/1	12 (ND)		NA	23.0 (Noncancer)			N	BSL
	56-55-3	Benzo(a)anthracene	0.87 (J)	0.87 (J)	mg/kg	SB-13	1/1	0.87 (J)		NA	0.15 (Cancer)			Y	ASL
	50-32-8	Benzo(a)pyrene	0.87 (J)	0.87 (J)	mg/kg	SB-13	1/1	0.87 (J)		NA	0.015 (Cancer)			Y	ASL
	205-99-2	Benzo(b)fluoroanthene	0.99 (J)	0.99 (J)	mg/kg	SB-13	1/1	0.99 (J)		NA	0.15 (Cancer)			Y	ASL
	191-24-2	Benzo(ghi)perylene	0.72 (J)	0.72 (J)	mg/kg	SB-13	1/1	0.72 (J)		NA	No Toxicity Value			NA	No Toxicity Values
	117-81-7	bis(2-ethylhexyl)phthalate	12 (ND)	12 (ND)	mg/kg	SB-13	1/1	12 (ND)		NA	35 (Cancer)			N	BSL
	218-01-9	Chrysene	0.83 (J)	0.83 (J)	mg/kg	SB-13	1/1	0.83 (J)		NA	15 (Cancer)			N	BSL
	91-20-3	dibenzofuran	12 (ND)	12 (ND)	mg/kg	SB-13	1/1	12 (ND)		NA	7.8(Noncancer)			Y	ASL
	206-44-0	Fluoroanthene	1.6 (J)	1.6 (J)	mg/kg	SB-13	1/1	1.6 (J)		NA	230 (Noncancer)			N	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.54 (J)	0.54 (J)	mg/kg	SB-13	1/1	0.54 (J)		NA	0.15 (Cancer)			Y	ASL
	91-20-3	Naphthalene	12 (ND)	12 (ND)	mg/kg	SB-13	1/1	12 (ND)		NA	3.6 (Cancer)			Y	ASL
	85-01-8	Phenanthrene	0.83 (J)	0.83 (J)	mg/kg	SB-13	1/1	0.83 (J)		NA	No Toxiicty Value			N	No Toxicity Values
	129-00-0	Pyrene	1.3 (J)	1.3 (J)	mg/kg	SB-13	1/1	1.3 (J)		NA	170 (Noncancer)			N	BSL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on the lowest concentration in soil associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the assessment (http://www.epa.gov/region9/superfund/prg/).

Definitions
ARAR - Applicable or Relevant and Appropriate Requirements
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ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantitation limit.
(E) Estimated concentration due to the presence of intereference (inorganics)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

TABLE 2.5 (Property E)

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil (4 to 4.3 Feet)
Exposure Medium: Soil (4 to 4.3 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Subsurface	1336-36-3	Total PCBs	0.65	0.65	mg/kg	SB-13	1/1	0.65	0.65	NA	0.2 Cancer			Y	ASL
Soils	7440-38-2	Arsenic	5.3	5.3	mg/kg	SB-13	1/1	5.3	5.3	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
(4 - 4.3 Feet)	18540-29-9	Chromium	34.3	34.3	mg/kg	SB-13	1/1	34.3	34.3	NA	0.29 (Cancer)			Y	ASL
	7440-66-6	Zinc	2560 (E)	2560 (E)	mg/kg	SB-13	1/1	2560 (E)	2560 (E)	NA	2,300 (Noncancer)			Y	ASL

(1) Maximum Concentration of all samples used as screening level.
(2) Screening Toxicity Concentration is based on the lowest concentration in soil associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the assessment (http://www.epa.gov/region9/superfund/prg/).

Definitions
ARAR - Applicable or Relevant and Appropriate Requirements
TBC - To Be Considered Values
COPC - Chemical of Potential Concern
ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantitation limit.
(E) Estimated concentration due to the presence of intereference (inorganics)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

TABLE 2.6 (Property E)

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil (4 to 4.3 Feet)
Exposure Medium: Soil (4 to 4.3 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Subsurface	1336-36-3	Total PCBs	0.65	0.65	mg/kg	SB-13	1/1	0.65	0.65	NA	0.2 Cancer			Y	ASL
Soils	7440-38-2	Arsenic	5.3	5.3	mg/kg	SB-13	1/1	5.3	5.3	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
(4 - 4.3 Feet)	18540-29-9	Chromium	34.3	34.3	mg/kg	SB-13	1/1	34.3	34.3	NA	0.29 (Cancer)			Y	ASL
	7440-50-8	Copper	167	167	mg/kg	SB-13	1/1	167	167	NA	310 (Noncancer)			N	BSL
	7439-92-1	Lead	316 E	316 E	mg/kg	SB-13	1/1	316 E	316 E	NA	400			N	BSL
	7440-66-6	Zinc	2560 (E)	2560 (E)	mg/kg	SB-13	1/1	2560 (E)	2560 (E)	NA	2,300 (Noncancer)			Y	ASL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on the lowest concentration in soil associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the assessment (http://www.epa.gov/region9/superfund/prg/).

Definitions

ARAR - Applicable or Relevant and Appropriate Requirements
TBC - To Be Considered Values
COPC - Chemical of Potential Concern
ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantitation limit.
(E) Estimated concentration due to the presence of intereference (inorganics)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

TABLE 3.1.RME (Property E)
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil (< 1.7 Feet)
Exposure Medium: Soil (< 1.7 Feet)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Surface Soil	Total PCBs	mg/kg	1.28	NA	4.160	4.160	mg/kg	Maximum (only four samples)	ProUCL 4.1
(< 1.7 Feet)	Benzo(a)anthracene	mg/kg	NA	NA	0.87 (J)	0.87 (J)	mg/kg	Maximum (one Sample)	ProUCL 4.1
Property E	Benzo(a)pyrene	mg/kg	NA	NA	0.87 (J)	0.86 (J)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Benzo(b)fluoroanthene	mg/kg	NA	NA	0.99 (J)	0.99 (J)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Dibenzofuran	mg/kg	NA	NA	12 (ND)	12 (ND)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Indeno(1,2,3-cd)pyrene	mg/kg	NA	NA	0.54 (J)	0.54 (J)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Naphthalene	mg/kg	NA	NA	12 (ND)	12 (ND)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Aluminum	mg/kg	NA	NA	11,400	11,400	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Arsenic (inorganic)	mg/kg	12.2	Data appear Normal at 5% Significance	20.8	20.8	mg/kg	Maximum (only four samples	ProUCL 4.1
	Cadmium	mg/kg	NA	NA	7.9 (N)	7.9 (N)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Chromium (VI)	mg/kg	46.08	Data not normal or log normal at 5%	157	157	mg/kg	Maximum (only four samples)	ProUCL 4.1
	Cobalt	mg/kg	NA	NA	19.0 (E)	19.0 (E)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Copper	mg/kg	205.9	NA	603	603	mg/kg	Maximum (one four samples	ProUCL 4.1
	Iron	mg/kg	19400	NA	103,000 (N)	103,000 (N)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Lead	mg/kg	370.2	Data not normal or log normal at 5% significance	672 (N)	370.2	mg/kg	Mean value for Lead (95% UCL is 530.3)	ProUCL 4.1
	Manganese	mg/kg	369	NA	522 (N)	522 (N)	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Mercury	mg/kg	NA	NA	1.9 (N)	1.9 (N)		Maximum (one Sample)	ProUCL 4.1
	Zinc	mg/kg	1,130	NA	2,140	2,140	mg/kg	Maximum (only four samples)	ProUCL 4.1

(1) Utilized ProUCL Version 4.1

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TABLE 3.2.RME (Property E)
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil (4.0 - 4.3 Feet)
Exposure Medium: Soil (4.0 - 4.3 Feet)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Surface Soil	Total PCBs	mg/kg	NA	NA	0.65	0.65	mg/kg	Maximum (one Sample)	ProUCL 4.1
(4.0 - 4.3 Feet)	Arsenic	mg/kg	NA	NA	5.3	5.3	mg/kg	Maximum (one Sample)	ProUCL 4.1
Property E	Chromium	mg/kg	NA	NA	34.3	34.3	mg/kg	Maximum (one Sample)	ProUCL 4.1
	Zinc	mg/kg	NA	NA	2560 (E)	2560 (E)	mg/kg	Maximum (one Sample)	ProUCL 4.1

(1) Utilized ProUCL Version 4.1

Table 3.3. Summary of Concentration Data And Sample Locations- Property E.

Chemicals	SS - 35	SS-16	SB-13 (0.2 - 0.9 Feet)	SB - 12	SB-13 0.9 - 1.7	
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
PCBs	0.15	NA	0.195 J	0.039 J	4.16	(also listed in Table 3.5)
Arsenic	12.2 N	NA	5.3	14.1	20.8	(also listed in Table 3.4
Chromium	15.1 EN	NA	7.7 E	16.3 E	157	(also listed in Table 3.4
Copper	164 EN	NA	20.7	74.8	603	(also listed in Table 3.4
Lead	387 E	438 E	71 E	334 E	672 (N)	(also listed in Table 3.4
Iron					103000 N	(also listed in Table 3.4
Zinc	431 E	N/A	225 E	293 E	2140 N	(also listed in Table 3.4

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Table 3.4. Summary of Data - Property E.

	SB-13 (0.9 - 1.7)	
Aluminum	11400	mg/kg
Antimony	2.1 BN	mg/kg
Arsenic (inorganic)	20.8	mg/kg
Barium	163	mg/kg
Beryllium	0.65 B	mg/kg
Cadmium	7.9 N	mg/kg
Chromium (VI)	157	mg/kg
Cobalt	19.0 E	mg/kg
Copper	603	mg/kg
Iron	103,000 N	mg/kg
Lead	672 N	mg/kg
Manganese	522 N	mg/kg
Mercury	1.9 N	mg/kg
Nickel	76.8 E	mg/kg
Selenium	6.9	mg/kg
Silver	2.9 N	mg/kg
Thallium (Soluble Salts)	2.1	mg/kg
Vanadium	21.6 E	mg/kg
Zinc	2140 N	mg/kg

Table 3.5. Summary of PAH Data for Property E

Chemicals	SB-13 (0.2 to 0.9)	SB-13 (0.9 - 1.7)	
2-Methylnaphthalene	NA	12 ND	
Benzo(a)anthracene		0.870 J	
Benzo(a)pyrene		0.860 J	
Benzo(b)fluoroanthene		0.990 J	
Benzo(ghi)perylene		0.720 J	
bis(2-ethylhexyl)phthalate		12 ND	
Chrysene		0.830 J	
dibenzofuran		12 ND	
Fluoroanthene		1.6 J	
Indeno(1,2,3-cd)pyrene		0.54 J	
Naphthalene		12 ND	
Phenanthrene		0.830 J	
Pyrene		1.3 J	
PCBs		4.16	(also listed in Table 3.3)

Table 3.6. Input for Specific Chemicals Used in ProUCL Analysis.

Arsenic	Chromium	Copper	Lead	Iron	Zinc
12.2	15.1	164	387	103000	431
14.1	16.3	74.8	438		293
20.8	7.7	20.7	672		225
5.3	157	603	71		2140
			334		

Table 3.6. Output from ProUCL for Arsenic and Chromium.

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic

General Statistics			
Number of Valid Observations	4	Number of Distinct Observations	4
Number of Missing Values	1		

Warning: This data set only has 4 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C0 was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Chromium

General Statistics			
Number of Valid Observations	4	Number of Distinct Observations	4
Number of Missing Values	1		

Warning: This data set only has 4 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C1 was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Table 3.8. ProUCL Output for Copper, Iron, and Zinc

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Copper

General Statistics			
Number of Valid Observations	4	Number of Distinct Observations	4
Number of Missing Values	1		

Warning: This data set only has 4 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C2 was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Iron

General Statistics			
Number of Valid Observations	1	Number of Distinct Observations	1
Number of Missing Values	1		

Warning: This data set only has 1 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C4 was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Zinc

General Statistics			
Number of Valid Observations	4	Number of Distinct Observations	4
Number of Missing Values	1		

Warning: This data set only has 4 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C5 was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Table 3.9. ProUCL Output for Lead

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead

General Statistics			
Number of Valid Observations	5	Number of Distinct Observations	5
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	71	Minimum of Log Data	4.263
Maximum	672	Maximum of Log Data	6.51
Mean	380.4	Mean of log Data	5.725
Median	387	SD of log Data	0.858
SD	215.8		
Coefficient of Variation	0.567		
Skewness	-0.196		

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Test Statistic	0.826
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	586.1	95% H-UCL	2802
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1065
95% Adjusted-CLT UCL (Chen-1995)	530.1	97.5% Chebyshev (MVUE) UCL	1350
95% Modified-t UCL (Johnson-1978)	584.7	99% Chebyshev (MVUE) UCL	1910
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.12	Data appear Normal at 5% Significance Level	
Theta Star	339.8		
MLE of Mean	380.4		
MLE of Standard Deviation	359.5		
nu star	11.2		
Approximate Chi Square Value (.05)	4.702	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	539.1
Adjusted Chi Square Value	3.049	95% Jackknife UCL	586.1
		95% Standard Bootstrap UCL	521.1
Anderson-Darling Test Statistic	0.44	95% Bootstrap-t UCL	576.4
Anderson-Darling 5% Critical Value	0.684	95% Hall's Bootstrap UCL	561.2
Kolmogorov-Smirnov Test Statistic	0.306	95% Percentile Bootstrap UCL	521.4
Kolmogorov-Smirnov 5% Critical Value	0.36	95% BCA Bootstrap UCL	505
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	801.1
		97.5% Chebyshev(Mean, Sd) UCL	983.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1341
95% Approximate Gamma UCL	905.7		
95% Adjusted Gamma UCL	1397		
Potential UCL to Use		Use 95% Student's-t UCL	586.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3.10. ProUCL Output for Zinc.

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Zinc.

General Statistics			
Number of Valid Observations	5	Number of Distinct Observations	4
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	225	Minimum of Log Data	5.416
Maximum	2140	Maximum of Log Data	7.669
Mean	662.8	Mean of log Data	6.049
Median	293	SD of log Data	0.943
SD	830.1		
Coefficient of Variation	1.252		
Skewness	2.18		

Warning: There are only 4 Distinct Values in this data
There are insufficient Distinct Values to perform some GOF tests and bootstrap methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values to compute bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10-15 or more observations for accurate and meaningful bootstrap results.

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.635	Shapiro Wilk Test Statistic	0.768
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1454	95% H-UCL	5966
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1646
95% Adjusted-CLT UCL (Chen-1995)	1660	97.5% Chebyshev (MVUE) UCL	2102
95% Modified-t UCL (Johnson-1978)	1514	99% Chebyshev (MVUE) UCL	2996
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.637	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	1041		
MLE of Mean	662.8		
MLE of Standard Deviation	830.5		
nu star	6.369		
Approximate Chi Square Value (.05)	1.831	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	1273
Adjusted Chi Square Value	0.96	95% Jackknife UCL	1454
		95% Standard Bootstrap UCL	1228
Anderson-Darling Test Statistic	0.81	95% Bootstrap-t UCL	9814
Anderson-Darling 5% Critical Value	0.689	95% Hall's Bootstrap UCL	4652
Kolmogorov-Smirnov Test Statistic	0.356	95% Percentile Bootstrap UCL	1374
Kolmogorov-Smirnov 5% Critical Value	0.363	95% BCA Bootstrap UCL	1415
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2281
		97.5% Chebyshev(Mean, Sd) UCL	2981
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4356
95% Approximate Gamma UCL	2305		
95% Adjusted Gamma UCL	4397		
Potential UCL to Use		Use 95% Approximate Gamma UCL	2305
Recommended UCL exceeds the maximum observation			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

USEPA (1991). Risk assessment guidance for Superfund. Volume I. Human health evaluation manual - Supplemental Guidance: Standard default exposure factors." Office of Emergency and Remedial Response (Washington, D.C.) OSWER Directive 9285.6-03. NTIS PB91-921314, 10 p, March 25, 1991.

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USEPA (2012). Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER 9200.1-113. USEPA, Washington, DC

TABLE 4.1.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	6	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	6	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

USEPA (1991). Risk assessment guidance for Superfund. Volume I. Human health evaluation manual - Supplemental Guidance: Standard default exposure factors." Office of Emergency and Remedial Response (Washington, D.C.) OSWER Directive 9285.6-03. NTIS PB91-921314, 10 p, March 25, 1991.

USEPA (2002). Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Office of Solid Waste and Emergency Response, Washington, D.C. December 2002.

TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - FOR CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.2.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	---
				ED	Exposure Duration (2 to 6 years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (2 years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (4 years)	1460	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	---
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.97	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.3.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	10	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	3650	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 Years)	10	years	EPA1991 and 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION CHEMICALS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.4.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA1991	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.5 .RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 1991	

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TABLE 4.6. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1999	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resdent	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.6.CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (3 years)	1095	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

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TABLE 4.7 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	year	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	year	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.7.CTE MMOA (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE -CHEMICALS WITH MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (3 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 2002	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - C *CF
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 2002	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.8 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	Mean of IR	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Speicfic	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	yrs	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.8 CTE MMOA for Child (6 to < 16 Years) (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD (6 TO < 16 YEARS) MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (1 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.9. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemcial Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

'(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.9 CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor (1)	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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USEPA (2005). Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. EPA/630/R-03/003F. EPA Risk Assessment Forum, Washington, D.C. March 2005.

TABLE 4.10 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	---
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	---
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.11.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction / Utility Worker	Adult (> 18 Years)	Subsurface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	330	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	60	days/year	EPA 1991	
				ED	Exposure Duration	1	years	EPA 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Construction / Utility Worker	Adult (> 18 Years)	Subsurface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	7	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	0.3	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	1	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.11.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Construction / Utility Worker	Adult (> 18 Years)	Subsurface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	60	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	1	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Construction / Utility Worker	Adult (> 18 Years)	Subsurface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	60	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	1	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	365	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December
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TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor-1016	Chronic	7E-05	mg/kg-day	1E+00	7E-05	mg/kg-day	reduced birth weight	100	IRIS	03/11/13
Aroclor-1254	Chronic	2E-05	mg/kg-day	1E+00	2E-05	mg/kg-day	immune system	300	IRIS	03/11/13
Benzo(a)anthracene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Benzo(a)pyrene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Benzo(b)fluoroanthene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Dibenzofuran	Chronic	1E-03	mg/kg-day	1E+00	1E-03	mg/kg-day	LOAEL Point of Departure		PPRTV (X)	03/11/13
Indeno(1,2,3-cd)pyrene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Naphthalene	Chronic	2E-02	mg/kg-day	1E+00	2E-02	mg/kg-day	N/A		IRIS	03/11/13
Aluminum	Chronic	1E+00	mg/kg-day	1E+00	1E+00	mg/kg-day	LOAEL		PPRTV	03/11/13
Arsenic (inorganic)	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Hyperpigmentation, keratosis and possible vascular complications	3	IRIS	03/11/13
Cadmium	Chronic	1E-03	mg/kg-day	0.025	3E-05	mg/kg-day	Significant proteinuria	10	IRIS	03/11/13
Chromium (VI)	Chronic	3E-03	mg/kg-day	1E+00	3E-03	mg/kg-day	NOAEL	300	IRIS	03/11/13
Cobalt	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	LOAEL with decreased iodine uptake		PPRTV	03/11/13
Copper	Chronic	4E-02	mg/kg-day	1E+00	4E-02	mg/kg-day	Irritation	(Not Stated)	HEAST	07/01/97
Iron	Chronic	7E-01	mg/kg-day	1E+00	7E-01	mg/kg-day	LOAEL - adverse GI effects		PPRTV	
Lead	Chronic									
Manganese	Chronic	1E-01	mg/kg-day	1E+00	1E-01	mg/kg-day	CNS effects (other effect: Impairment of neurobehavioral function.)	1	IRIS	03/11/13
Mercury	Chronic	1E-04	mg/kg-day	1E+00	1E-04	mg/kg-day	Neurological	10	IRIS	03/11/13
Zinc	Chronic	3E-01	mg/kg-day	1E+00	3E-01	mg/kg-day	LOAEL	3	IRIS	03/11/13

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor 1254	Chronic	7E-08	mg/m3			immune system	100	Route to Route Extrapolation	9/20/2009
Aroclor 1016	Chronic	2E-07	mg/m3			reduced birthweight	300	Route to Route Extrapolation	9/20/2009
Benzo(a)anthracene		NA				NA			
Benzo(a)pyrene		NA				NA			
Benzo(b)fluoroanthene		NA				NA			
Dibenzofuran		NA							
Indeno(1,2,3-cd)pyrene		NA				NA			
Napthalene	Chronic	3E-03	mg/m3			Nasal effects: hyperplasia and metaplasia in respiratory and olfactory epithelium, respectively	3000	IRIS	03/11/13
Aluminum	Chronic	5E-03	mg/m3					PPRTV	
Arsenic (inorganic)	Chronic	1.5E-05	mg/m3			Development; cardiovascular system; nervous system; lung; skin	Not Listed	CalEPA	03/11/13
Cadmium	Chronic	2.0E-05	mg/m3					CalEPA	03/11/13
Chromium (VI)	Chronic	1E-04	mg/m3			Lactate dehydrogenase in bronchioalveolar lavage fluid	300	IRIS	03/11/13
Cobalt	Chronic	6E-06	mg/m3					PPRTV	03/11/13
Copper	Chronic	NA	mg/m3			NA	NA	IRIS	03/11/13
Iron		NA							
Lead		NA							
Manganese	Chronic	5E-05	mg/m3			Impairment of neuro-behavioral function (other effect: Impairment of neurobehavioral function.	1,000	IRIS	03/11/13
Mercury	Chronic	3E-04	mg/m3			Lowest Observed Adverse Effect Level	30	IRIS	03/11/13
Zinc	Chronic	NA	mg/m3			NA	NA	IRIS	3/11/2013

Definitions

CalEPA - California Environmental Protection Agency

IRIS - Integrated Risk Information System

PPRTV - Provisional Peer Reviewed Toxicity Values

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units	(1)	Value (2)	Units	(3)	Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(a)anthracene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(a)pyrene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(b)fluoroanthene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Dibenzofuran	NA							
Indeno(1,2,3-cd)pyrene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Napthalene	NA							
Aluminum	NA							
Arsenic (inorganic)	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/13/2013
Cadmium	NA					B2	IRIS	03/13/2013
Chromium (VI)	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	5.0E-01	$(mg/kg\text{-}day)^{-1}$	A	NJDEP/CalEPA	03/13/2013
Cobalt	NA							
Copper	NA		NA	NA		D	IRIS	3/13/2013
Iron	NA							
Lead	NA							
Manganese	NA							
Mercury	NA	$(mg/kg\text{-}day)^{-1}$	NA	NA	$(mg/kg\text{-}day)^{-1}$	D	IRIS	03/13/13
Zinc	NA	$(mg/kg\text{-}day)^{-1}$	NA	NA	$(mg/kg\text{-}day)^{-1}$	D	IRIS	03/13/13

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

(2) Based on oral cancer slope factor for Dermal exposure, if an absorption factor has been applied

(3) Weight of Evidence Classification

A - Known human carcinogen

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

D - Not classifiable as to carcinogenicity

Definitions:

CalEPA - California Environmental Protection Agency

IRIS - Integrated Risk Information System

NJDEP - New Jersey Department of Environmental Protection

mg/kg-day - milligram/kilogram-day

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value (1)	Units	(3)	Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	5.7E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
PCBs (Total)	1.0E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(a)anthracene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(a)pyrene	1.1#-03	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(b)fluoroanthene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Dibenzofuran	NA						
Indeno(1,2,3-cd)pyrene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Naphthalene	3.4E-05	$(ug/m3)^{-1}$				CalEPA	03/13/2013
Aluminum	NA						
Arsenic (inorganic)	4.3E-03	$(ug/m3)^{-1}$			A	IRIS	03/13/2013
Cadmium	1.8E-03	$(ug/m3)^{-1}$			B2	IRIS	03/13/2013
Chromium (VI)	8.4E-02	$(ug/m3)^{-1}$			A	NJDEP/CalEPA	03/13/2013
Copper	NA				D	IRIS	3/13/2013
Cobalt	9.0E-03	$(ug/m3)^{-1}$				PPRTV	04/21/09
Iron	NA						
Lead	NA						
Manganese	NA						
Mercury	NA						
Zinc	NA				D	IRIS	March-13

(1) Based on IRIS file inhalation cancer slope factor for dust or aerosol inhalation

(2) Based on IRIS recommendation when addressing Inhalation of evaporated congeners

(3) Weight of Evidence Classification

A - Known human carcinogen

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

D - Not classifiable as to carcinogenicity

<u>Definitions:</u>

CalEPA - California Environmental Protection Agency

IRIS - Integrated Risk Information System

NJDEP - New Jersey Department of Environmental Protection

mg/kg-day - milligram/kilogram-day

PPRTV - Provisional Peer Reviewed Toxicity Value

TABLE 7.1.RME (Property E) (Page 1)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Benzo(a)anthracene (< 2 yrs)	0.87	mg/kg	3.2E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	2.3E-06			NA		
		Property E		Benzo(a)anthracene (2 to 6 yrs)	0.87	mg/kg	6.4E-07	mg/kg day	2.19	(mg/kg-day)$^{-1}$	1.4E-06			NA		
				Benzo(a)anthracene (6 to < 16 yrs)	0.87	mg/kg	1.7E-07	mg/kg day	2.19	(mg/kg-day)$^{-1}$	3.7E-07			NA		
				Benzo(a)pyrene (< 2 yrs)	0.87	mg/kg	3.2E-07	mg/kg day	73	(mg/kg-day)$^{-1}$	2.3E-05			NA		
				Benzo(a)pyrene (2 to 6 yrs)	0.87	mg/kg	6.4E-07	mg/kg day	21.9	(mg/kg-day)$^{-1}$	1.4E-05			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	0.87	mg/kg	1.7E-07	mg/kg day	21.9	(mg/kg-day)$^{-1}$	3.7E-06			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	0.99	mg/kg	3.6E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	2.6E-06			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	0.99	mg/kg	7.2E-07	mg/kg day	2.19	(mg/kg-day)$^{-1}$	1.6E-06			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	0.99	mg/kg	1.9E-07	mg/kg day	2.19	(mg/kg-day)$^{-1}$	4.2E-07			NA		
				Dibenzofuran	6	mg/kg	6.6E-06	mg/kg day				7.7E-05	mg/kg day	0.001	mg/kg day	0.08
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.54	mg/kg	2.0E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	1.4E-06			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.54	mg/kg	3.9E-07	mg/kg day	2.19	(mg/kg-day)$^{-1}$	8.6E-07			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.54	mg/kg	1.1E-07	mg/kg day	2.19	(mg/kg-day)$^{-1}$	2.3E-07			NA		
				Napthalene (< 2 yrs)	6	mg/kg	2.2E-06	mg/kg day	NA			7.7E-05	mg/kg day	0.02	mg/kg day	0.004
				Napthalene (2 to < 6 yrs)	6	mg/kg	4.4E-06	mg/kg day	NA			7.7E-05	mg/kg day	0.02	mg/kg day	0.004
				Napthalene (6 to < 16 yrs)	6	mg/kg	1.2E-06	mg/kg day	NA			8.2E-06	mg/kg day	0.02	mg/kg day	0.0004
				Aluminum	11400	mg/kg	1.2E-02	mg/kg day	NA			3.1E-02	mg/kg day	1	mg/kg day	0.03
				Arsenic (inorganic)	20.80	mg/kg	1.4E-05	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	6.8E-05	0.000266	mg/kg day	0.003	mg/kg day	0.09
				Cadmium	7.90	mg/kg	8.7E-06	mg/kg day	NA			0.000101	mg/kg day	0.001	mg/kg day	0.10
				Chromium (VI) (< 2)	157	mg/kg	5.7E-05	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	2.9E-04	4.3E-04	mg/kg day	0.003	mg/kg day	0.14
				Chromium (VI) (2 to 6)	157	mg/kg	1.1E-04	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.7E-04	4.3E-04	mg/kg day	0.003	mg/kg day	0.14
				Chromium (VI) (6 to < 16 yrs.)	157	mg/kg	3.1E-05	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	4.6E-05	2.2E-04	mg/kg day	0.003	mg/kg day	0.07
				Cobalt	19	mg/kg	2.1E-05	mg/kg day	NA			0.000243	mg/kg day	0.0003	mg/kg day	0.81
				Copper	603.0	mg/kg	6.6E-04	mg/kg day	NA			0.007710	mg/kg day	0.04	mg/kg day	0.19
				Iron	103000	mg/kg	1.1E-01	mg/kg day	NA			1.316895	mg/kg day	0.7	mg/kg day	1.88
				Manganese	522	mg/kg	5.7E-04	mg/kg day	NA			0.006674	mg/kg day	0.02	mg/kg day	0.28
				Mercury	1.90	mg/kg	2.1E-06	mg/kg day	NA			0.000024	mg/kg day	0.0001	mg/kg day	0.24
				Zinc	2140	mg/kg	2.3E-03	mg/kg day	NA			0.027361	mg/kg day	0.3	mg/kg day	0.09
				PCBs	4.16	mg/kg	4.6E-06	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	9.1E-06	0.000053	mg/kg day	0.00002	mg/kg day	2.66
			Exp. Route Total								6.3E-04					6.82

TABLE 7.1.RME (Property E) - Page 2

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Dermal	PCBs	4.16	mg/kg	1.8E-06	mg/kg day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.6E-06	2.1E-05	mg/kg day	0.00002	mg/kg day	1.04
	Property E			Benzo(a)anthracene (< 2 yrs)	0.87	mg/kg	1.2E-07	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	2.5E-07			NA		
				Benzo(a)anthracene (> 2 to 6 yrs)	0.87	mg/kg	2.3E-07	mg/kg day	2.19	$(mg/kg\text{-}day)^{-1}$	5.1E-07			NA		
				Benzo(a)anthracene (6 to <16 yrs)	0.87	mg/kg	8.8E-08	mg/kg day	2.19	$(mg/kg\text{-}day)^{-1}$	6.4E-06			NA		
				Benzo(a)pyrene (< 2 yrs)	0.87	mg/kg	1.2E-07	mg/kg day	73	$(mg/kg\text{-}day)^{-1}$	8.4E-06			NA		
				Benzo(a)pyrene (2 to 6 yrs)	0.87	mg/kg	2.3E-07	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	5.1E-06			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	0.87	mg/kg	8.8E-08	mg/kg day	21.9	$(mg/kg\text{-}day)^{-1}$	1.9E-06			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	0.99	mg/kg	1.3E-07	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	2.9E-07			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	0.99	mg/kg	2.6E-07	mg/kg day	2.19	$(mg/kg\text{-}day)^{-1}$	5.8E-07			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	0.99	mg/kg	2.9E-07	mg/kg day	2.19	$(mg/kg\text{-}day)^{-1}$	2.1E-06			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.54	mg/kg	7.2E-08	mg/kg day	7.3	$(mg/kg\text{-}day)^{-1}$	5.2E-07			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.54	mg/kg	1.4E-07	mg/kg day	2.19	$(mg/kg\text{-}day)^{-1}$	3.1E-07			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.54	mg/kg	5.5E-08	mg/kg day	2.19	$(mg/kg\text{-}day)^{-1}$	1.2E-07			NA		
				Napthalene (< 2 yrs)	6	mg/kg	8.0E-07	mg/kg day	NA			2.8E-05	mg/kg day	0.02	mg/kg day	0.0000005
				Napthalene (2 to 6 yrs)	6	mg/kg	1.6E-06	mg/kg day	NA			2.8E-05	mg/kg day	0.02	mg/kg day	0.0000005
				Napthalene (6 to < 16 yrs)	6	mg/kg	6.1E-07	mg/kg day	NA			4.3E-06	mg/kg day	0.02	mg/kg day	0.00000007
				Cadmium	7.9	mg/kg	2.4E-08	mg/kg day	NA			2.8E-07	mg/kg day	0.00003	mg/kg day	0.009
				Arsenic (inorganic)	20.8	mg/kg	1.9E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-06	2.2E-05	mg/kg day	0.0003	mg/kg day	0.0000004
			Exp. Route Total								3.3E-05					1.1

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TABLE 7.1.RME (Property E) - Page 3

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Inhalation	Benzo(a)anthracene (< 2 yrs)	0.87	mg/kg	1.7E-08	ug/m3	1.10E-03	$(ug/m3)^{-1}$	1.9E-11			NA		
		Property E	(Fugitive Dust)	Benzo(a)anthracene (2 to 6 yrs)	0.87	mg/kg	3.4E-08	ug/m3	3.30E-04	$(ug/m3)^{-1}$	1.1E-11			NA		
				Benzo(a)anthracene (6 to < 16 yrs)	0.87	mg/kg	8.8E-08	ug/m3	3.30E-04	$(ug/m3)^{-1}$	2.9E-11			NA		
				Benzo(a)pyrene (< 2 yrs)	0.87	mg/kg	1.7E-08	ug/m3	1.10E-02	$(ug/m3)^{-1}$	1.9E-10			NA		
				Benzo(a)pyrene (2 to 6 yrs)	0.87	mg/kg	3.4E-08	ug/m3	3.30E-03	$(ug/m3)^{-1}$	1.1E-10			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	0.87	mg/kg	8.8E-08	ug/m3	3.30E-03	$(ug/m3)^{-1}$	2.9E-10			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	0.99	mg/kg	1.9E-08	ug/m3	1.10E-03	$(ug/m3)^{-1}$	2.1E-11			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	0.99	mg/kg	3.9E-08	ug/m3	3.30E-04	$(ug/m3)^{-1}$	1.3E-11			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	0.99	mg/kg	1.0E-07	ug/m3	3.30E-04	$(ug/m3)^{-1}$	3.3E-11			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.54	mg/kg	1.1E-08	ug/m3	1.10E-03	$(ug/m3)^{-1}$	1.2E-11			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.54	mg/kg	2.1E-08	ug/m3	3.30E-04	$(ug/m3)^{-1}$	7.0E-12			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.54	mg/kg	5.3E-08	ug/m3	3.30E-04	$(ug/m3)^{-1}$	1.7E-11			NA		
				Napthalene (<2 Years)	6.0	mg/kg	1.2E-07	ug/m3	3.40E-04	$(ug/m3)^{-1}$	4.0E-11	1.15E-04	mg/m3	0.003	mg/m3	0.04
				Napthalene (2 to 6 Years)	6.0	mg/kg	2.3E-07	ug/m3	1.02E-04	$(ug/m3)^{-1}$	2.4E-11	1.15E-04	mg/m3	0.003	mg/m3	0.04
				Napthalene (6 to < 16 Years)	6.0	mg/kg	6.0E-07	ug/m3	1.02E-04	$(ug/m3)^{-1}$	6.2E-11	1.15E-04	mg/m3	0.003	mg/m3	0.04
				Arsenic (inorganic)	20.8	mg/kg	1.2E-06	ug/m3	4.4E-03	$(ug/m3)^{-1}$	5.4E-09	1.42E-08	mg/m3	0.000015	mg/m3	0.0009
				Cadmium	7.9	mg/kg	4.6E-07	ug/m3	1.8E-03	$(ug/m3)^{-1}$	8.3E-10					
				Chromium (VI) (< 2 years)	157	mg/kg	3.1E-06	ug/m3	8.4E-01	$(ug/m3)^{-1}$	2.6E-06	1.08E-07	mg/m3	0.0001	mg/m3	0.001
				Chromium (VI) (2 to 6 years)	157	mg/kg	6.1E-06	ug/m3	2.5E-01	$(ug/m3)^{-1}$	1.5E-06	1.08E-07	mg/m3	0.0001	mg/m3	0.001
				Chromium (VI) (6 to < 16 years)	157	mg/kg	1.6E-05	ug/m3	2.5E-01	$(ug/m3)^{-1}$	4.0E-06	1.08E-07	mg/m3	0.0001	mg/m3	0.001
				Cobalt	19	mg/kg	1.1E-06	ug/m3	9.00E-03	$(ug/m3)^{-1}$	1.0E-08	1.30E-08	mg/m3	0.000006	mg/m3	0.002
				Manganese	522	mg/kg	3.1E-05	ug/m3	NA	$(ug/m3)^{-1}$	NA	3.58E-07	mg/m3	0.00005	mg/m3	0.007
				PCBs	4.16	mg/kg	2.4E-07	ug/m3	5.7E-04	$(ug/m3)^{-1}$	1.4E-10	2.85E-09	mg/m3	0.00000007	mg/m3	0.04
			Exp. Route Total								8.1E-06					0.2
		Exposure Point Total									6.8E-04					8.04
Exposure Medium Total											6.8E-04					8.0
Surface Soil Total											6.8E-04					8.0
											6.8E-04					8.0
							Total of Child Risks Across All Media				**6.8E-04**	**Total of Child Hazards Across All Media**				**8.0**

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TABLE 7.2.RME (Property E)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult (> 18 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Benzo(a)anthracene	0.87	mg/kg	2.4E-07	mg/kg day	0.73	(mg/kg-day)$^{-1}$	1.7E-07			NA		
				Benzo(a)pyrene	0.87	mg/kg	2.4E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	1.7E-06			NA		
				Benzo(b)fluoroanthene	0.99	mg/kg	2.7E-07	mg/kg day	0.73	(mg/kg-day)$^{-1}$	2.0E-07			NA		
				Dibenzofuran	6	mg/kg	2.8E-06	mg/kg day				8.2E-06	mg/kg day	0.001	mg/kg day	0.01
				Indeno(1,2,3-cd)pyrene	0.54	mg/kg	1.5E-07	mg/kg day	0.73	(mg/kg-day)$^{-1}$	1.1E-07			NA		
				Napthalene	6	mg/kg	1.6E-06	mg/kg day	NA			0.00002	mg/kg day	0.02	mg/kg day	0.001
				Aluminum	11400	mg/kg	5.4E-03	mg/kg day	NA			0.02	mg/kg day	1	mg/kg day	0.02
				Arsenic (inorganic)	20.8	mg/kg	9.8E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.5E-05	0.00003	mg/kg day	0.003	mg/kg day	0.01
				Cadmium	7.9	mg/kg	3.7E-06	mg/kg day	NA			0.00001	mg/kg day	0.001	mg/kg day	0.01
				Chromium (VI)	157	mg/kg	4.3E-05	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	2.2E-05	0.0002	mg/kg day	0.003	mg/kg day	0.07
				Cobalt	19	mg/kg	8.9E-06	mg/kg day	NA			0.00003	mg/kg day	0.0003	mg/kg day	0.09
				Copper	603	mg/kg	2.8E-04	mg/kg day	NA			0.0008	mg/kg day	0.04	mg/kg day	0.02
				Iron	103000	mg/kg	4.8E-02	mg/kg day	NA			0.14	mg/kg day	0.7	mg/kg day	0.20
				Manganese	522	mg/kg	2.5E-04	mg/kg day	NA			0.0007	mg/kg day	0.02	mg/kg day	0.03
				Mercury	1.9	mg/kg	8.9E-07	mg/kg day	NA			0.000003	mg/kg day	0.0001	mg/kg day	0.03
				Zinc	2140	mg/kg	1.0E-03	mg/kg day	NA			0.003	mg/kg day	0.3	mg/kg day	0.01
				PCBs	4.2	mg/kg	2.0E-06	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	3.9E-06	0.000006	mg/kg day	0.00002	mg/kg day	0.28
			Exp. Route Total								4.2E-05					0.78
		Residence	Dermal	PCBs	4.16	mg/kg	1.1E-06	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	2.2E-06	3.2E-06	mg/kg day	0.00002	mg/kg day	0.16
				Benzo(a)anthracene	0.87	mg/kg	1.2E-07	mg/kg day	0.73	(mg/kg-day)$^{-1}$	9.0E-08			NA		
				Benzo(a)pyrene	0.87	mg/kg	1.2E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	9.0E-07			NA		
				Benzo(b)fluoroanthene	0.99	mg/kg	1.4E-07	mg/kg day	0.73	(mg/kg-day)$^{-1}$	1.0E-07			NA		
				Indeno(1,2,3-cd)pyrene	0.54	mg/kg	7.7E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	5.6E-08			NA		
				Napthalene	6.0	mg/kg	8.5E-07	mg/kg day	NA			4.3E-06	mg/kg day	0.02	mg/kg day	0.0002
				Cadmium	7.9	mg/kg	1.5E-08	mg/kg day	NA			4.3E-08	mg/kg day	0.00003	mg/kg day	0.001
				Arsenic (inorganic)	20.8	mg/kg	1.2E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.8E-06	3.4E-06	mg/kg day	0.0003	mg/kg day	0.01
			Exp. Route Total								5.1E-06					0.2
		Residence	Inhalation (Fugitive Dust)	Benzo(a)anthracene (< 2 yrs)	0.87	mg/kg	1.2E-07	ug/m3	1.10E-04	(ug/m3)$^{-1}$	1.3E-11			NA		
				Benzo(a)pyrene (< 2 yrs)	0.87	mg/kg	1.2E-07	ug/m3	1.10E-03	(ug/m3)$^{-1}$	1.3E-10			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	0.99	mg/kg	1.4E-07	ug/m3	1.10E-04	(ug/m3)$^{-1}$	1.5E-11			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.54	mg/kg	7.4E-08	ug/m3	1.10E-04	(ug/m3)$^{-1}$	8.1E-12			NA		
				Napthalene (<2 Years)	6.00	mg/kg	8.2E-07	ug/m3	3.40E-05	(ug/m3)$^{-1}$	2.8E-11	1.15E-04	mg/m3	0.003	mg/m3	0.04
				Arsenic (inorganic)	20.8	mg/kg	4.9E-06	ug/m3	4.4E-03	(ug/m3)$^{-1}$	2.1E-08	1.42E-08	mg/m3	0.000015	mg/m3	0.0009
				Cadmium	7.9	mg/kg	1.9E-06	ug/m3	1.8E-03	(ug/m3)$^{-1}$	3.3E-09					
				Chromium (VI) (< 2 years)	157	mg/kg	2.2E-05	ug/m3	8.4E-02	(ug/m3)$^{-1}$	1.8E-06	1.08E-07	mg/m3	0.0001	mg/m3	0.001
				Cobalt	19	mg/kg	4.5E-06	ug/m3	9.00E-03	(ug/m3)$^{-1}$	4.0E-08	1.30E-08	mg/m3	0.000006	mg/m3	0.002
				Manganese	522	mg/kg	1.2E-04	ug/m3	NA	(ug/m3)$^{-1}$	NA	3.58E-07	mg/m3	0.00005	mg/m3	0.007
				PCBs	4.16	mg/kg	9.8E-07	ug/m3	5.7E-04	(ug/m3)$^{-1}$	5.6E-10	2.85E-09	mg/m3	0.00000007	mg/m3	0.04
			Exp. Route Total								1.9E-06					0.1
		Exposure Point Total									4.9E-05					1.0
	Exposure Medium										4.9E-05					1.0
Surface Soil Total											4.9E-05					1.0
											4.9E-05					1.0

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TABLE 7.3.CTE (Property E) - Page 1
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
Central Tendency Exposure
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Benzo(a)anthracene (< 2 yrs)	0.87	mg/kg	7.9E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	5.8E-07			NA		
		Property E		Benzo(a)anthracene (2 to 6 yrs)	0.87	mg/kg	7.9E-08	mg/kg day	2.19	(mg/kg-day)$^{-1}$	1.7E-07			NA		
				Benzo(a)anthracene (6 to < 16 yrs)	0.87	mg/kg	8.5E-09	mg/kg day	2.19	(mg/kg-day)$^{-1}$	1.9E-08			NA		
				Benzo(a)pyrene (< 2 yrs)	0.87	mg/kg	7.9E-08	mg/kg day	73	(mg/kg-day)$^{-1}$	5.8E-06			NA		
				Benzo(a)pyrene (2 to 6 yrs)	0.87	mg/kg	7.9E-08	mg/kg day	21.9	(mg/kg-day)$^{-1}$	1.7E-06			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	0.87	mg/kg	8.5E-09	mg/kg day	21.9	(mg/kg-day)$^{-1}$	1.9E-07			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	0.99	mg/kg	9.0E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	6.6E-07			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	0.99	mg/kg	9.0E-08	mg/kg day	2.19	(mg/kg-day)$^{-1}$	2.0E-07			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	0.99	mg/kg	9.7E-09	mg/kg day	2.19	(mg/kg-day)$^{-1}$	2.1E-08			NA		
				Dibenzofuran	6	mg/kg	1.6E-06	mg/kg day				3.8E-05	mg/kg day	0.001	mg/kg day	0.04
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.54	mg/kg	4.9E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	3.6E-07			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.54	mg/kg	4.9E-08	mg/kg day	2.19	(mg/kg-day)$^{-1}$	1.1E-07			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.54	mg/kg	5.3E-09	mg/kg day	2.19	(mg/kg-day)$^{-1}$	1.2E-08			NA		
				Napthalene (< 2 yrs)	6	mg/kg	5.5E-07	mg/kg day	NA			3.8E-05	mg/kg day	0.02	mg/kg day	0.002
				Napthalene (2 to < 6 yrs)	6	mg/kg	5.5E-07	mg/kg day	NA			3.8E-05	mg/kg day	0.02	mg/kg day	0.002
				Napthalene (6 to < 16 yrs)	6	mg/kg	5.9E-08	mg/kg day	NA			8.2E-06	mg/kg day	0.02	mg/kg day	0.0004
				Aluminum	11400	mg/kg	3.1E-03	mg/kg day	NA			1.6E-02	mg/kg day	1	mg/kg day	0.02
				Arsenic (inorganic)	20.8	mg/kg	5.7E-06	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	2.8E-05	0.0001	mg/kg day	0.003	mg/kg day	0.04
				Cadmium	7.9	mg/kg	2.2E-06	mg/kg day	NA			0.00005	mg/kg day	0.001	mg/kg day	0.05
				Chromium (VI) (< 2)	157	mg/kg	1.4E-05	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	7.2E-05	0.0002	mg/kg day	0.003	mg/kg day	0.07
				Chromium (VI) (2 to 6)	157	mg/kg	1.4E-05	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.2E-05	0.0002	mg/kg day	0.003	mg/kg day	0.07
				Chromium (VI) (6 to < 16 yrs.)	157	mg/kg	1.5E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.3E-06	0.0002	mg/kg day	0.003	mg/kg day	0.07
				Cobalt	19.0	mg/kg	5.2E-06	mg/kg day	NA			0.000121	mg/kg day	0.0003	mg/kg day	0.40
				Copper	603	mg/kg	1.7E-04	mg/kg day	NA			0.003855	mg/kg day	0.04	mg/kg day	0.10
				Iron	103000	mg/kg	2.8E-02	mg/kg day	NA			0.658447	mg/kg day	0.7	mg/kg day	0.94
				Manganese	522	mg/kg	1.4E-04	mg/kg day	NA			0.003337	mg/kg day	0.02	mg/kg day	0.14
				Mercury	1.90	mg/kg	5.2E-07	mg/kg day	NA			0.000012	mg/kg day	0.0001	mg/kg day	0.12
				Zinc	2140	mg/kg	5.9E-04	mg/kg day	NA			0.013680	mg/kg day	0.3	mg/kg day	0.05
				PCBs	4.16	mg/kg	1.1E-06	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	2.3E-06	0.000027	mg/kg day	0.00002	mg/kg day	1.33
			Exp. Route Total								1.4E-04					3.45

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TABLE 7.3.CTE (Property E)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Central Tendency Exposure

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Dermal	PCBs	4.16	mg/kg	1.8E-07	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	3.6E-07	4.2E-06	mg/kg day	0.00002	mg/kg day	0.21
		Property E		Benzo(a)anthracene (< 2 yrs)	0.87	mg/kg	1.2E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	2.5E-08			NA		
				Benzo(a)anthracene (> 2 to 6 yrs)	0.87	mg/kg	1.2E-08	mg/kg day	2.19	(mg/kg-day)$^{-1}$	2.5E-08			NA		
				Benzo(a)anthracene (6 to <16 yrs)	0.87	mg/kg	1.3E-09	mg/kg day	2.19	(mg/kg-day)$^{-1}$	9.2E-08			NA		
				Benzo(a)pyrene (< 2 yrs)	0.87	mg/kg	1.2E-08	mg/kg day	73	(mg/kg-day)$^{-1}$	8.4E-07			NA		
				Benzo(a)pyrene (2 to 6 yrs)	0.87	mg/kg	1.2E-08	mg/kg day	21.9	(mg/kg-day)$^{-1}$	2.5E-07			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	0.87	mg/kg	1.3E-09	mg/kg day	21.9	(mg/kg-day)$^{-1}$	2.8E-08			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	0.99	mg/kg	1.3E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	2.9E-08			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	0.99	mg/kg	1.3E-08	mg/kg day	2.19	(mg/kg-day)$^{-1}$	2.9E-08			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	0.99	mg/kg	1.4E-09	mg/kg day	2.19	(mg/kg-day)$^{-1}$	1.0E-08			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.54	mg/kg	7.2E-09	mg/kg day	7.3	(mg/kg-day)$^{-1}$	5.2E-08			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.54	mg/kg	7.2E-09	mg/kg day	2.19	(mg/kg-day)$^{-1}$	1.6E-08			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.54	mg/kg	7.8E-10	mg/kg day	2.19	(mg/kg-day)$^{-1}$	1.7E-09			NA		
				Napthalene (< 2 yrs)	6	mg/kg	8.0E-08	mg/kg day	NA			5.6E-06	mg/kg day	0.02	mg/kg day	0.0003
				Napthalene (2 to 6 yrs)	6	mg/kg	8.0E-08	mg/kg day	NA			5.6E-06	mg/kg day	0.02	mg/kg day	0.0003
				Napthalene (6 to < 16 yrs)	6	mg/kg	8.7E-09	mg/kg day	NA			6.1E-07	mg/kg day	0.02	mg/kg day	0.00003
				Cadmium	7.9	mg/kg	2.4E-09	mg/kg day	NA			5.7E-08	mg/kg day	0.00003	mg/kg day	0.002
				Arsenic (inorganic)	20.8	mg/kg	1.9E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.9E-07	4.5E-06	mg/kg day	0.0003	mg/kg day	0.01
			Exp. Route Total								2.1E-06					0.2

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TABLE 7.3.CTE (Property E) - Page 3

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Central Tendency Exposure

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Inhalation	Benzo(a)anthracene (< 2 yrs)	0.87	mg/kg	8.5E-09	ug/m3	1.10E-03	$(ug/m3)^{-1}$	9.4E-12			NA		
		Property E	(Fugitive Dust)	Benzo(a)anthracene (2 to 6 yrs)	0.87	mg/kg	8.5E-09	ug/m3	3.30E-04	$(ug/m3)^{-1}$	2.8E-12			NA		
				Benzo(a)anthracene (6 to < 16 yrs)	0.87	mg/kg	8.8E-09	ug/m3	3.30E-04	$(ug/m3)^{-1}$	2.9E-12			NA		
				Benzo(a)pyrene (< 2 yrs)	0.87	mg/kg	8.5E-09	ug/m3	1.10E-02	$(ug/m3)^{-1}$	9.4E-11			NA		
				Benzo(a)pyrene (2 to 6 yrs)	0.87	mg/kg	8.5E-09	ug/m3	3.30E-03	$(ug/m3)^{-1}$	2.8E-11			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	0.87	mg/kg	8.8E-09	ug/m3	3.30E-03	$(ug/m3)^{-1}$	2.9E-11			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	0.99	mg/kg	9.7E-09	ug/m3	1.10E-03	$(ug/m3)^{-1}$	1.1E-11			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	0.99	mg/kg	9.7E-09	ug/m3	3.30E-04	$(ug/m3)^{-1}$	3.2E-12			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	0.99	mg/kg	1.0E-08	ug/m3	3.30E-04	$(ug/m3)^{-1}$	3.3E-12			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.54	mg/kg	5.3E-09	ug/m3	1.10E-03	$(ug/m3)^{-1}$	5.8E-12			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.54	mg/kg	5.3E-09	ug/m3	3.30E-04	$(ug/m3)^{-1}$	1.7E-12			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.54	mg/kg	5.4E-09	ug/m3	3.30E-04	$(ug/m3)^{-1}$	1.8E-12			NA		
				Napthalene (<2 Years)	6	mg/kg	5.9E-08	ug/m3	3.40E-04	$(ug/m3)^{-1}$	2.0E-11	1.15E-04	mg/m3	0.003	mg/m3	0.04
				Napthalene (2 to 6 Years)	6	mg/kg	5.9E-08	ug/m3	1.02E-04	$(ug/m3)^{-1}$	6.0E-12	1.15E-04	mg/m3	0.003	mg/m3	0.04
				Napthalene (6 to < 16 Years)	6	mg/kg	5.9E-08	ug/m3	1.02E-04	$(ug/m3)^{-1}$	6.0E-12	1.15E-04	mg/m3	0.003	mg/m3	0.04
				Arsenic (inorganic)	20.8	mg/kg	6.1E-07	ug/m3	4.4E-03	$(ug/m3)^{-1}$	2.7E-09	1.42E-08	mg/m3	0.000015	mg/m3	0.0009
				Cadmium	7.9	mg/kg	2.3E-07	ug/m3	1.8E-03	$(ug/m3)^{-1}$	4.2E-10					
				Chromium (VI) (< 2 years)	157	mg/kg	1.5E-06	ug/m3	8.4E-01	$(ug/m3)^{-1}$	1.3E-06	1.08E-07	mg/m3	0.0001	mg/m3	0.001
				Chromium (VI) (2 to 6 years)	157	mg/kg	1.5E-06	ug/m3	2.5E-01	$(ug/m3)^{-1}$	3.9E-07	1.08E-07	mg/m3	0.0001	mg/m3	0.001
				Chromium (VI) (6 to < 16 years)	157	mg/kg	1.6E-06	ug/m3	2.5E-01	$(ug/m3)^{-1}$	4.0E-07	1.08E-07	mg/m3	0.0001	mg/m3	0.001
				Cobalt	19	mg/kg	5.6E-07	ug/m3	9.00E-03	$(ug/m3)^{-1}$	5.0E-09	1.30E-08	mg/m3	0.000006	mg/m3	0.002
				Manganese	522	mg/kg	1.5E-05	ug/m3	NA	$(ug/m3)^{-1}$	NA	3.58E-07	mg/m3	0.00005	mg/m3	0.007
				PCBs	4.16	mg/kg	1.2E-07	ug/m3	5.7E-04	$(ug/m3)^{-1}$	7.0E-11	2.85E-09	mg/m3	0.00000007	mg/m3	0.04
			Exp. Route Total								2.1E-06					0.2
		Exposure Point Total									1.4E-04					3.8
	Exposure Medium Total										1.4E-04					3.8
Surface Soil Total											1.4E-04					3.8
									Total of Child Risks Across All Media		1.4E-04	Total of Child Hazards Across All Media				3.8

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TABLE 7.4.RME (Property E)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Central Tendency Exposure

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult (> 18 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Benzo(a)anthracene	0.87	mg/kg	5.1E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	3.7E-08			NA		
		Property E		Benzo(a)pyrene	0.87	mg/kg	5.1E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	3.7E-07			NA		
				Benzo(b)fluoroanthene	0.99	mg/kg	5.8E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	4.2E-08			NA		
				Dibenzofuran	6	mg/kg	3.5E-07	mg/kg day				4.1E-06	mg/kg day	0.001	mg/kg day	0.004
				Indeno(1,2,3-cd)pyrene	0.54	mg/kg	3.2E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	2.3E-08			NA		
				Napthalene	6	mg/kg	3.5E-07	mg/kg day	NA			4.1E-06	mg/kg day	0.02	mg/kg day	0.0002
				Aluminum	11400	mg/kg	6.7E-04	mg/kg day	NA			7.8E-03	mg/kg day	1	mg/kg day	0.01
				Arsenic (inorganic)	20.8	mg/kg	7.3E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.1E-06	1.4E-05	mg/kg day	0.003	mg/kg day	0.005
				Cadmium	7.9	mg/kg	4.6E-07	mg/kg day	NA			5.4E-06	mg/kg day	0.001	mg/kg day	0.01
				Chromium (VI)	157	mg/kg	9.2E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	4.6E-06	1.1E-04	mg/kg day	0.003	mg/kg day	0.04
				Cobalt	19	mg/kg	1.1E-06	mg/kg day	NA			1.3E-05	mg/kg day	0.0003	mg/kg day	0.04
				Copper	603	mg/kg	3.5E-05	mg/kg day	NA			4.1E-04	mg/kg day	0.04	mg/kg day	0.01
				Iron	103000	mg/kg	6.0E-03	mg/kg day	NA			7.1E-02	mg/kg day	0.7	mg/kg day	0.10
				Manganese	522	mg/kg	3.1E-05	mg/kg day	NA			3.6E-04	mg/kg day	0.02	mg/kg day	0.01
				Mercury	1.90	mg/kg	1.1E-07	mg/kg day	NA			1.3E-06	mg/kg day	0.0001	mg/kg day	0.01
				Zinc	2140	mg/kg	1.3E-04	mg/kg day	NA			1.5E-03	mg/kg day	0.3	mg/kg day	0.00005
				PCBs	4.16	mg/kg	2.4E-07	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	4.9E-07	2.8E-06	mg/kg day	0.00002	mg/kg day	0.14
			Exp. Route Total								6.7E-06					0.38
		Residence	Dermal	PCBs	4.16	mg/kg	3.9E-08	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	7.8E-08	4.5E-07	mg/kg day	0.00002	mg/kg day	0.02
				Benzo(a)anthracene	0.87	mg/kg	7.6E-09	mg/kg day	0.73	(mg/kg-day)$^{-1}$	5.5E-09			NA		
				Benzo(a)pyrene	0.87	mg/kg	7.6E-09	mg/kg day	7.3	(mg/kg-day)$^{-1}$	5.5E-08			NA		
				Benzo(b)fluoroanthene	0.99	mg/kg	8.6E-09	mg/kg day	0.73	(mg/kg-day)$^{-1}$	6.3E-09			NA		
				Indeno(1,2,3-cd)pyrene	0.54	mg/kg	4.7E-09	mg/kg day	0.73	(mg/kg-day)$^{-1}$	3.4E-09			NA		
				Napthalene	6	mg/kg	5.2E-08	mg/kg day	NA			6.1E-07	mg/kg day	0.02	mg/kg day	0.00000001
				Cadmium	7.9	mg/kg	5.3E-10	mg/kg day	NA			6.2E-09	mg/kg day	0.00003	mg/kg day	0.0002
				Arsenic (inorganic)	20.8	mg/kg	4.2E-08	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	6.3E-08	4.9E-07	mg/kg day	0.0003	mg/kg day	0.000000008
			Exp. Route Total								2.1E-07					0.02
		Residence	Inhalation (Fugitive Dust)	Benzo(a)anthracene	0.87	mg/kg	5.1E-08	ug/m3	1.10E-04	(ug/m3)$^{-1}$	5.6E-12			NA		
				Benzo(a)pyrene	0.87	mg/kg	5.1E-08	ug/m3	1.10E-03	(ug/m3)$^{-1}$	5.6E-11			NA		
				Benzo(b)fluoroanthene	0.99	mg/kg	5.8E-08	ug/m3	1.10E-04	(ug/m3)$^{-1}$	6.4E-12			NA		
				Indeno(1,2,3-cd)pyrene	0.54	mg/kg	3.2E-08	ug/m3	1.10E-04	(ug/m3)$^{-1}$	3.5E-12			NA		
				Napthalene	6.0	mg/kg	3.5E-07	ug/m3	3.40E-05	(ug/m3)$^{-1}$	1.2E-11	1.15E-04	mg/m3	0.003	mg/m3	0.04
				Arsenic (inorganic)	20.8	mg/kg	1.2E-06	ug/m3	4.4E-03	(ug/m3)$^{-1}$	5.4E-09	1.42E-08	mg/m3	0.000015	mg/m3	0.0009
				Cadmium	7.9	mg/kg	4.6E-07	ug/m3	1.8E-03	(ug/m3)$^{-1}$	8.3E-10					
				Chromium (VI)	157	mg/kg	9.2E-06	ug/m3	8.4E-02	(ug/m3)$^{-1}$	7.7E-07	1.08E-07	mg/m3	0.0001	mg/m3	0.001
				Cobalt	19	mg/kg	1.1E-06	ug/m3	9.00E-03	(ug/m3)$^{-1}$	1.0E-08	1.30E-08	mg/m3	0.000006	mg/m3	0.002
				Manganese	522	mg/kg	3.1E-05	ug/m3	NA	(ug/m3)$^{-1}$	NA	3.58E-07	mg/m3	0.00005	mg/m3	0.007
				PCBs	4.16	mg/kg	2.4E-07	ug/m3	5.7E-04	(ug/m3)$^{-1}$	1.4E-10	2.85E-09	mg/m3	0.00007	mg/m3	0.00004
			Exp. Route Total								7.9E-07					0.05
		Exposure Point Total									7.7E-06					0.5
	Exposure Medium Total										7.7E-06					0.5
Surface Soil Total											7.7E-06					0.5
											7.7E-06					0.5
							Total of Receptor Risks Across All Media				**7.7E-06**	Total of Receptor Hazards Across All Media				**0.5**

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TABLE 7.4.RME (Property E)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Central Tendency Exposure

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Construction/Utility Worker
Receptor Age: Adult (> 18 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence Property E	Ingestion	Arsenic (inorganic)	5.3	mg/kg	3.5E-08	mg/kg day	1.5	$(mg/kg\text{-}day)^{-1}$	5.3E-08	2.5E-06		3.00E-03		0.001
				Chromium	34.3		3.8E-07	mg/kg day	0.5	$(mg/kg\text{-}day)^{-1}$	1.9E-07	2.7E-05		3.00E-03		0.009
				Zinc	2560	mg/kg	2.8E-05	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$	NA	2.0E-03		0.3		0.007
				PCBs	0.65	mg/kg	6.1E-09	mg/kg day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-08	5.0E-07	mg/kg day	0.00002	mg/kg day	0.03
			Exp. Route Total								2.5E-07					0.04
			Dermal	PCBs	0.65	mg/kg	5.2E-09	mg/kg day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-08	3.7E-07	mg/kg day	0.00002	mg/kg day	0.000000006
				Arsenic (inorganic)	5.3	mg/kg	9.1E-09	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-08	6.4E-06	mg/kg day	0.0003	mg/kg day	0.0000001
			Exp. Route Total								2.9E-07					0.0000001
		Residence	Inhalation (Fugitive Dust)	Arsenic (inorganic)	5.3	mg/kg	8.9E-09	ug/m3	4.4E-03	$(ug/m3)^{-1}$	3.9E-11	6.22E-10	mg/m3	0.000015	mg/m3	0.00004
				Chromium (VI)	34.3	mg/kg	5.8E-08	ug/m3	8.4E-02	$(ug/m3)^{-1}$	4.8E-09	4.03E-09	mg/m3	0.0001	mg/m3	0.00004
				PCBs	0.65	mg/kg	1.1E-09	ug/m3	5.7E-04	$(ug/m3)^{-1}$	6.2E-13	7.63E-11	mg/m3	0.00007	mg/m3	0.000001
			Exp. Route Total								4.9E-09					0.00008
		Exposure Point Total									3.0E-07					0.04
	Exposure Medium Total										3.0E-07					0.04
Surface Soil Total											3.0E-07					0.04
											3.0E-07					0.04
							Total of Construction / Utility Worker Across All Media				**3.0E-07**	**Total of Construction Worker/Utility Worker Across All Media**				**0.04**

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TABLE 10.1.RME (Property E)
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil Property E	Resident (child) (Property E)	Benzo(a)anthracene (< 2 yrs)	2.3E-06	1.9E-11	2.5E-07		2.6E-06					
			Benzo(a)anthracene (2 to 6 yrs)	1.4E-06	1.1E-11	5.1E-07		1.9E-06					
			Benzo(a)anthracene (6 to < 16 yrs)	3.7E-07	2.9E-11	6.4E-06		6.8E-06					
			Benzo(a)pyrene (< 2 yrs)	2.3E-05	1.9E-10	8.4E-06		3.2E-05					
			Benzo(a)pyrene (2 to 6 yrs)	1.4E-05	1.1E-10	5.1E-06		1.9E-05					
			Benzo(a)pyrene (6 to < 16 yrs)	3.7E-06	2.9E-10	1.9E-06		5.7E-06					
			Benzo(b)fluoroanthene (< 2 yrs)	2.6E-06	2.1E-11	2.9E-07		2.9E-06					
			Benzo(b)fluoroanthene (2 to 6 yrs)	1.6E-06	1.3E-11	5.8E-07		2.2E-06					
			Benzo(b)fluoroanthene (6 to < 16 yrs)	4.2E-07	3.3E-11	2.1E-06		4.2E-07					
			Dibenzofuran						LOAEL Point of Departure	0.08			0.08
			Indeno(1,2,3-cd)pyrene (< 2 yrs)	1.4E-06	1.2E-11	5.2E-07		2.0E-06					
			Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	8.6E-07	7.0E-12	3.1E-07		1.2E-06					
			Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	2.3E-07	1.7E-11	1.2E-07		3.5E-07					
			Napthalene (< 2 yrs)		4.0E-11			4.0E-11	Decreased bodyweight in males	0.004	0.04	0.0000005	0.04
			Napthalene (2 to < 6 yrs)		2.4E-11			2.4E-11	Decreased bodyweight in males	0.004	0.04	0.0000005	0.04
			Napthalene (6 to < 16 yrs)		6.2E-11			6.2E-11	Decreased bodyweight in males	0.0004	0.04	0.00000007	0.04
			Aluminum						LOAEL minimal neurotoxicity	0.03			0.03
			Arsenic (inorganic)	6.8E-05	5.4E-09	2.9E-06		7.1E-05	Hyperpigmentation	0.09	0.0009	0.0000004	0.09
			Cadmium		8.30E-10			8.3E-10	Significant Proteinuria	0.10		0.009	0.11
			Chromium (VI) (< 2)	2.9E-04	2.6E-06			2.9E-04	NOAEL Point of Departure/Nasal Septum	0.14	0.001		0.14
			Chromium (VI) (2 to 6)	1.7E-04	1.5E-06			1.7E-04	Atrophy	0.14	0.001		0.14
			Chromium (VI) (6 to < 16 yrs.)	4.6E-05	4.0E-06			5.0E-05		0.07	0.001		0.07
			Cobalt		1.0E-08			1.0E-08	LOAEL with decreased iodine uptake	0.81	0.002		0.81
			Copper						Irritation	0.19			0.19
			Iron						LOAEL - adverse GI effects	1.88			1.88
			Manganese						CNS Effects	0.28	0.007		0.29
			Mercury						Neurological	0.24			0.24
			Zinc						LOAEL	0.09			0.09
			PCBs	9.1E-06	1.4E-10	2.9E-06		1.2E-05	Immune System	2.66	0.04	1.04	3.74
		Exposure Point Total		6.3E-04	8E-06	3E-05		6.7E-04		6.8	0.17	1.0	8.0
	Exposure Medium Total												
Medium Total													
Receptor Total						Child Risk Total		7E-04			Child HI Total		8.0

HI (Immune System)	3.7
HI (LOAEL adverse GI Effects)	1.9

TABLE 10.1.RME (Property E)

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Resident (Adult)	Benzo(a)anthracene	1.7E-07	1.3E-11	9.0E-08		2.6E-07					
	Property E	(Property E)	Benzo(a)pyrene	1.7E-06	1.3E-10	9.0E-07		2.6E-06					
			Benzo(b)fluoroanthene	2.0E-07	1.5E-11	1.0E-07		3.0E-07					
			Dibenzofuran						LOAEL Point of Departure	0.01			0.01
			Indeno(1,2,3-cd)pyrene	1.1E-07	8.1E-12	5.6E-08		1.6E-07					
			Napthalene		2.8E-11			2.8E-11	Decreased bodyweight in males	0.001	0.04	0.0002	0.04
			Aluminum						LOAEL minimal neurotoxicity	0.02			0.02
			Arsenic (inorganic)	1.5E-05	2.8E-08	1.5E-06		1.7E-05	Hyperpigmentation	0.01	0.0009	0.01	0.02
			Cadmium		3.3E-09			3.3E-09	Significant Proteinuria	0.01		0.001	0.01
			Chromium (VI)	2.2E-05	1.8E-06			2.3E-05	NOAEL Point of Deparature/Nasal Septum Atrophy	0.07	0.001		0.07
			Cobalt		4.0E-08			4.0E-08	LOAEL with decreased iodine uptake	0.09	0.002		0.09
			Copper						Irritation	0.02			0.02
			Iron						LOAEL - adverse GI effects	0.20			0.20
			Manganese						CNS Effects	0.03	0.007		0.04
			Mercury						Neurological	0.03			0.03
			Zinc						LOAEL	0.01			0.01
			PCBs	3.9E-06	5.6E-10	2.2E-06		6.1E-06	Immune System	0.28	0.04	0.16	0.48
		Exposure Point Total		4.3E-05	2E-06	5E-06		5.0E-05		0.8	0.091	0.2	1.0
	Exposure Medium Total												
Medium Total							Child Risk Total	6.6E-04				Child HI Total	8
Receptor Total							Adult Risk Total	5.0E-05				Adult HI Total	1.0
Receptor Total							Total Risk	7E-04					

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TABLE 10.2.CTE (Property E)

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil Property E	Resident (child) (Property E)	Benzo(a)anthracene (< 2 yrs)	5.8E-07	9.4E-12	3.6E-07		9.4E-07					
			Benzo(a)anthracene (2 to 6 yrs)	1.7E-07	2.8E-12	2.5E-08		2.0E-07					
			Benzo(a)anthracene (6 to < 16 yrs)	1.9E-08	2.9E-12	2.5E-08		4.4E-08					
			Benzo(a)pyrene (< 2 yrs)	5.8E-06	9.4E-11	9.2E-08		5.9E-06					
			Benzo(a)pyrene (2 to 6 yrs)	1.7E-06	2.8E-11	8.4E-07		2.5E-06					
			Benzo(a)pyrene (6 to < 16 yrs)	1.9E-07	2.9E-11	2.5E-07		4.4E-07					
			Benzo(b)fluoroanthene (< 2 yrs)	6.6E-07	1.1E-11	2.8E-08		6.9E-07					
			Benzo(b)fluoroanthene (2 to 6 yrs)	2.0E-07	3.2E-12	2.9E-08		2.3E-07					
			Benzo(b)fluoroanthene (6 to < 16 yrs)	2.1E-08	3.3E-12	1.0E-08		2.1E-08					
			Dibenzofuran						LOAEL Point of Departure	0.04			0.04
			Indeno(1,2,3-cd)pyrene (< 2 yrs)	3.6E-07	5.8E-12	5.2E-08		4.1E-07					
			Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	1.1E-07	1.7E-12	1.6E-08		1.3E-07					
			Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	1.2E-08	1.8E-12	1.7E-09		1.4E-08					
			Napthalene (< 2 yrs)		2.0E-11			2.0E-11	Decreased bodyweight in males	0.002	0.04	0.0003	0.04
			Napthalene (2 to < 6 yrs)		6.0E-12			6.0E-12	Decreased bodyweight in males	0.002	0.04	0.0003	0.04
			Napthalene (6 to < 16 yrs)		6.0E-12			6.0E-12	Decreased bodyweight in males	0.0004	0.04	0.00003	0.04
			Aluminum						LOAEL minimal neurotoxicity	0.02			0.02
			Arsenic (inorganic)	2.8E-05	2.7E-09			2.8E-05	Hyperpigmentation	0.04	0.0009	0.01	0.05
			Cadmium		4.20E-10			4.2E-10	Significant Proteinuria	0.05		0.002	0.05
			Chromium (VI) (< 2)	7.2E-05	1.3E-06			7.3E-05	NOAEL Point of Departure/Nasal Septum	0.07	0.001		0.07
			Chromium (VI) (2 to 6)	2.2E-05	3.9E-07			2.2E-05	Atrophy	0.07	0.001		0.07
			Chromium (VI) (6 to < 16 yrs.)	2.3E-06	4.0E-07			2.7E-06		0.07	0.001		0.07
			Cobalt		5.0E-09			5.0E-09	LOAEL with decreased iodine uptake	0.40	0.002		0.40
			Copper						Irritation	0.10			0.10
			Iron						LOAEL - adverse GI effects	0.94			0.94
			Manganese						CNS Effects	0.14	0.007		0.15
			Mercury						Neurological	0.12			0.12
			Zinc						LOAEL	0.05			0.05
			PCBs	2.3E-06	7.0E-11	2.9E-07		2.6E-06	Immune System	1.33	0.04	0.21	1.58
		Exposure Point Total		1.4E-04	2E-06	2E-06		1.4E-04		3.4	0.2	0.2	3.8
	Exposure Medium Total												
Medium Total													
Receptor Total						Child Risk Total		1E-04			Child HI Total		3.8

HI (Immune System)	1.6
HI (LOAEL adverse GI Effects)	0.9

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TABLE 10.1.RME (Property E)
RISK SUMMARY
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil Property E	Resident (Adult) (Property E)	Benzo(a)anthracene	3.7E-08	5.8E-12	5.5E-09		4.3E-08					
			Benzo(a)pyrene	3.7E-07	5.6E-11	5.5E-08		4.3E-07					
			Benzo(b)fluoroanthene	4.2E-08	6.4E-12	6.3E-09		4.8E-08					
			Dibenzofuran						LOAEL Point of Departure	0.004			0.004
			Indeno(1,2,3-cd)pyrene	2.3E-08	3.5E-12	3.4E-09		2.6E-08					
			Napthalene		1.2E-11			1.2E-11	Decreased bodyweight in males	0.0002	0.04	0.00000001	0.04
			Aluminum						LOAEL minimal neurotoxicity	0.01			0.01
			Arsenic (inorganic)	1.1E-06	5.4E-09	6.3E-08		1.2E-06	Hyperpigmentation	0.005	0.0009	0.00000007	0.006
			Cadmium		8.3E-10			8.3E-10	Significant Proteinuria	0.01		0.0002	0.01
			Chromium (VI)	4.6E-06	7.7E-07			5.4E-06	NOAEL Point of Deparature/Nasal Septum Atrophy	0.04	0.001		0.04
			Cobalt		1.0E-08			1.0E-08	LOAEL with decreased iodine uptake	0.04	0.002		0.04
			Copper						Irritation	0.01			0.01
			Iron						LOAEL - adverse GI effects	0.10			0.10
			Manganese						CNS Effects	0.01			0.01
			Mercury						Neurological	0.01	0.007		0.02
			Zinc						LOAEL	0.0001			0.0001
			PCBs	4.9E-07	1.4E-10	7.8E-08		5.7E-07	Immune System	0.14	0.00004	0.02	0.16
		Exposure Point Total		6.7E-06	8E-07	2E-07		7.7E-06		0.4	0.04	0.02	0.4
	Exposure Medium Total												
Medium Total							Child Risk	1.0E-04					
Receptor Total							Adult Risk Total	7.7E-06				Adult HI Total	0.4
Receptor Total							Total Risk	1E-04				Child HI Total	3.8

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TABLE 1.1 (Property F)
SELECTION OF EXPOSURE PATHWAYS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe	Media	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current / Future	Soil (< 0.17 Feet)	Surface Soil (< 0.17 Feet)	Residence	Resident	Adult	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
			Residence	Resident	Child (< 16 years)	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Dermal Contact	Quantitative	
						Inhalation of Fugitive Dust	Quantitative	
Future	Subsurface Soil (5 to 20 Feet)	Subsurface Soil (5 to 20 Feet)	Site	Construction/ Utility Worker	Adult	Ingestion	Qualitative	This pathway is evaluated qualitative based on a lack of data on chemical concentrations at depth.
						Inhalation of Fugitive Dust	Qualitative	
						Dermal Contact	Qualitative	

TABLE 2.1 (Property F)
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 0.17 Feet)
Exposure Medium: Surface Soil (< 0.17 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)		Maximum Concentration (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property F)	1336-36-3	Total PCBs	0.110	(ND)	0.260		mg/kg	SS-34	1/2	0.15 - 0.26	0.260	NA	0.2 (Cancer)			Y	ASL
	7440-38-2	Arsenic (inorganic)	11.6	(N)	13	(N)	mg/kg	SS-34	2/2	11.6 (N) - 13 (N)	13 (N)	NA	0.61 (Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	13.1	(EN)	18	(EN)	mg/kg	SS-34	2/2	13.1 (EN) - 18 (EN)	18 (EN)	NA	0.29 (Cancer)			Y	ASL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The screening concentrations were obtained from the May 2013 Regional Screening Level Tables available at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/.

TABLE 2.2 (Property F)

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 0.17 Feet)
Exposure Medium: Surface Soil (< 0.17 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)		Maximum Concentration (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)
Surface Soil (Property F)	1336-36-3	Total PCBs	0.110	(ND)	0.260		mg/kg	SS-34	2/2	0.15 - 0.26	0.260	NA	0.2 (Cancer)			Y
	7440-38-2	Arsenic (inorganic)	11.6	(N)	13	(N)	mg/kg	SS-34	2/2	11.6 (N) - 13 (N)	13 (N)	NA	0.61 (Cancer)			Y
	18540-29-9	Chromium (VI)	13.1	(EN)	18	(EN)	mg/kg	SS-34	2/2	13.1 (EN) - 18 (EN)	18 (EN)	NA	0.29 (Cancer)			Y
	7440-50-8	Copper	51.2	(EN)	112	(EN)	mg/kg	SS-34	2/2	51.2 (EN) - 112 (EN)	112 (EN)	NA	310 (Noncancer)			N
	7439-92-1	Lead	56.2	(E)	342	(E)	mg/kg	SS-34	3/3	56.2 (E) - 342 (E)	342 (E)	NA	400			N
	7440-66-6	Zinc	485	(E)	581	(E)	mg/kg	SS-34	2/2	485 (E) - 581 (E)	581 (E)	NA	2,300 (Noncancer)			N

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The screening concentrations were obtained from the May 2013 Regional Screening Level Tables available at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/.

Lead

342
226
56.2
208.1

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TABLE 3.1.RME (Property F)

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future

Medium: Soil (0 to 0.17 Feet)

Exposure Medium: Soil (0 to 0.17 Feet)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Surface Soil	Total PCBs	mg/kg	0.16		0.26	0.26	mg/kg	Maximum -only 2 Distinct Values	ProUCL 4.1
(< 0.17 Feet)	Arsenic (inorganic)	mg/kg	12.35		13 (N)	13 (N)	mg/kg	Maximum - only 2 Distinct Values	ProUCL 4.1
Property F	Chromium (VI)	mg/kg	15.55		18 (EN)	18 (EN)	mg/kg	Maximum - only 2 Distinct Values	ProUCL 4.1

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.1.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	6	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	6	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - FOR CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.2.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (2 years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (4 years)	1460	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.97	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.3.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	10	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	3650	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 Years)	10	years	EPA1991 and 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION CHEMICALS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.4.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA1991	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.5 .RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 1991	

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TABLE 4.6. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1999	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resdent	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.6.CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (3 years)	1095	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

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TABLE 4.7 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	year	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	year	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.7.CTE MMOA (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE -CHEMICALS WITH MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (3 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 2002	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - C *CF
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 2002	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.8 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	Mean of IR	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Speicfic	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	yrs	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.8 CTE MMOA for Child (6 to < 16 Years) (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD (6 TO < 16 YEARS) MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (1 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.9. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemcial Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

'(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.9 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor (1)	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.10 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor-1016	Chronic	7E-05	mg/kg-day	1E+00	7E-05	mg/kg-day	Developmental (low birth weight)	100	IRIS	03/11/13
Aroclor-1254	Chronic	2E-05	mg/kg-day	1E+00	2E-05	mg/kg-day	immune system	300	IRIS	03/11/13
Arsenic (inorganic)	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Hyperpigmentation, keratosis and possible vascular complications	3	IRIS	03/11/13
Chromium (VI)	Chronic	3E-03	mg/kg-day	3E-02	8E-05	mg/kg-day	None	300	IRIS	03/11/13

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor 1254	Chornic	7E-08	mg/m3			immune system	1E+02	Route to Route Extrapolation	9/20/2009
Aroclor 1016	Chornic	2E-07	mg/m3			reduced birthweight	3E+02	Route to Route Extrapolation	9/20/2009
Arsenic (inorganic)	Chronic	1.5E-05	mg/m3			Development; cardiovascular system; nervous system; lung; skin	Not Listed	CalEPA	03/11/13
Chromium (VI)	Chronic	1E-04	mg/m3			Lactate dehydrogenase in bronchioalveolar lavage fluid	300	IRIS	03/11/13

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units	(1)	Value (2)	Units		Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Arsenic (inorganic)	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/13/2013
Chromium (VI)	5.0E-01	$(mg/kg\text{-}day)^{-1}$	3E-02	2.0E+01	$(mg/kg\text{-}day)^{-1}$	A	NJDEP/CalEPA	03/13/2013

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans ; A - known human carcinogen

(2) Based on oral cancer slope factor for Dermal exposure, if an absorption factor has been applied

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value (1)	Units		Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	5.7E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
PCBs (Total)	1.0E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Arsenic (inorganic)	4.3E-03	$(ug/m3)^{-1}$			A	IRIS	03/13/2013
Chromium (VI)	8.4E-02	$(ug/m3)^{-1}$			A	NJDEP/CalEPA	03/13/2013

A - Known Human Carcinogen

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

(1) Based on IRIS file inhalation cancer slope factor for dust or aerosol inhalation

(2) Based on IRIS recommendation when addressing Inhalation of evaporated congeners

R2-0014674

TABLE 7.1.RME (Property F)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				Hazard Quotient
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Arsenic (inorganic)	13.0	mg/kg	8.5E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-05	0.0001	mg/kg day	0.0003	mg/kg day	0.33
				Chromium (VI) (< 2)	18.0	mg/kg	6.6E-06	mg/kg day	5.0E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-05	0.0002	mg/kg day	0.003	mg/kg day	0.08
				Chromium (VI) (2 to 6)	18.0	mg/kg	1.3E-05	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-05	0.0002	mg/kg day	0.003	mg/kg day	0.08
				Chromium (VI) (6 to < 16)	18.0	mg/kg	3.5E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.3E-06	0.00002	mg/kg day	0.003	mg/kg day	0.01
				PCBs	0.26	mg/kg	2.8E-07	mg/kg day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-07	0.000003	mg/kg day	0.00002	mg/kg day	0.17
			Exp. Route Total								7.1E-05					0.7
		Residence	Dermal	PCBs	0.3	mg/kg	1.1E-07	mg/kg day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-07	1.3E-06	mg/kg day	0.00002	mg/kg day	0.07
				Arsenic (inorganic)	13.0	mg/kg	1.2E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-06	1.4E-05	mg/kg day	0.0003	mg/kg day	0.05
			Exp. Route Total								2.0E-06					0.11
		Residence	Inhalation (Fugitive Dust)	Arsenic (inorganic)	13.0	mg/kg	7.6E-07	ug/m3	4.3E-03	$(ug/m3)^{-1}$	3.3E-09	8.9E-09	ug/m3	0.000015	mg/m3	0.0006
				Chromium (VI) (< 2 years)	18.0	mg/kg	3.5E-07	ug/m3	8.4E-01	$(ug/m3)^{-1}$	3.0E-07	1.2E-08	ug/m3	0.0001	mg/m3	0.0001
				Chromium (VI) (2 to 6 years)	18.0	mg/kg	7.0E-07	ug/m3	2.52E-01	$(ug/m3)^{-1}$	1.8E-07	1.2E-08	ug/m3	0.0001	mg/m3	0.0001
				Chromium (VI) (6 to < 16 years)	18.0	mg/kg	1.8E-06	ug/m3	2.52E-01	$(ug/m3)^{-1}$	4.4E-07	1.2E-08	ug/m3	0.0001	mg/m3	0.0001
				PCBs	0.26	mg/kg	1.5E-08	ug/m3	5.7E-04	$(ug/m3)^{-1}$	8.7E-12	1.8E-10	ug/m3	0.00007	mg/m3	0.000003
			Exp. Route Total								9.2E-07					0.001
		Exposure Point Total									7.4E-05					0.8
	Exposure Medium Total										7.4E-05					0.8
Surface Soil Total											7.4E-05					0.8
											7.4E-05					0.8
							Total of Receptor Risks Across All Media				**7.4E-05**	**Total of Receptor Hazards Across All Media**				**0.8**

TABLE 7.1.RME (Property f)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Adult (> 18)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Arsenic (inorganic)	13.0	mg/kg	6.1E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	9.2E-06	0.000018	mg/kg day	0.0003	mg/kg day	0.06
				Chromium (VI)	18	mg/kg	4.9E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	2.5E-06	0.000025	mg/kg day	0.003	mg/kg day	0.01
				PCBs	0.26	mg/kg	1.2E-07	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	2.4E-07	0.0000004	mg/kg day	0.00002	mg/kg day	0.02
			Exp. Route Total								1.2E-05					0.09
		Residence	Dermal	PCBs	0.26	mg/kg	6.8E-08	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	1.4E-07	0.0000002	mg/kg day	0.00002	mg/kg day	0.01
				Arsenic (inorganic)	13.0	mg/kg	7.3E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.1E-06	0.000002	mg/kg day	0.0003	mg/kg day	0.01
			Exp. Route Total								1.2E-06					0.02
		Residence	Inhalation (Fugitive Dust)	Arsenic (inorganic)	13.0	mg/kg	3.1E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	1.3E-08	0.000000009	ug/m3	0.000015	mg/m3	0.0006
				Chromium (VI)	18.0	mg/kg	2.5E-06	ug/m3	8.4E-02	(ug/m3)$^{-1}$	2.1E-07	0.00000001	ug/m3	0.0001	mg/m3	0.0001
				PCBs	0.26	mg/kg	6.1E-08	ug/m3	5.7E-04	(ug/m3)$^{-1}$	3.5E-11	0.0000000002	ug/m3	0.00007	mg/m3	0.000003
			Exp. Route Total								2.2E-07					0.0007
		Exposure Point Total									1.3E-05					0.1
	Exposure Medium Total										1.3E-05					0.1
Surface Soil Total											1.3E-05					0.1
											1.3E-05					0.1
							Total of Receptor Risks Across All Media				**1.3E-05**	**Total of Receptor Hazards Across All Media**				**0.1**

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TABLE 7.1.RME (Property f)
CENTRAL TENDENCY EXPOSURE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Arsenic (inorganic)	13.0	mg/kg	2.1E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.2E-06	0.00005	mg/kg day	0.0003	mg/kg day	0.17
				Chromium (VI) (1 to < 2)	18.0	mg/kg	1.6E-06	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	8.2E-06	0.0001	mg/kg day	0.003	mg/kg day	0.04
				Chromium (VI) (2 to 6)	18.0	mg/kg	1.6E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.5E-06	0.0001	mg/kg day	0.003	mg/kg day	0.04
				Chromium (VI) (6 to < 16)	18.0	mg/kg	1.8E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.6E-07	0.00001	mg/kg day	0.003	mg/kg day	0.004
				PCBs	0.26	mg/kg	7.1E-08	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	1.4E-07	0.000002	mg/kg day	0.00002	mg/kg day	0.08
			Exp. Route Total								1.4E-05					0.3
		Residence	Dermal	PCBs	0.26	mg/kg	1.1E-08	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	2.2E-08	2.6E-07	mg/kg day	0.00002	mg/kg day	0.01
				Arsenic (inorganic)	13.0	mg/kg	1.2E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.8E-07	2.8E-06	mg/kg day	0.0003	mg/kg day	0.01
			Exp. Route Total								2.0E-07					0.02
		Residence	Inhalation (Fugitive Dust)	Arsenic (inorganic)	13.0	mg/kg	3.8E-07	ug/m3	4.3E-03	(ug/m3)$^{-1}$	1.6E-09	8.9E-09	ug/m3	0.000015	mg/m3	0.0006
				Chromium (VI) (1 to < 2 years)	18.0	mg/kg	1.8E-07	ug/m3	8.4E-01	(ug/m3)$^{-1}$	1.5E-07	1.2E-08	ug/m3	0.0001	mg/m3	0.0001
				Chromium (VI) (2 to 6 years)	18.0	mg/kg	1.8E-07	ug/m3	2.5E-01	(ug/m3)$^{-1}$	4.4E-08	1.2E-08	ug/m3	0.0001	mg/m3	0.0001
				Chromium (VI) (6 to < 16 years)	18.0	mg/kg	1.8E-07	ug/m3	2.5E-01	(ug/m3)$^{-1}$	4.4E-08	1.2E-08	ug/m3	0.0001	mg/m3	0.0001
				PCBs	0.26	mg/kg	7.6E-09	ug/m3	5.7E-04	(ug/m3)$^{-1}$	4.4E-12	1.8E-10	ug/m3	0.00007	mg/m3	0.000003
			Exp. Route Total								2.4E-07					0.001
		Exposure Point Total									1.5E-05					0.4
	Exposure Medium Total										1.5E-05					0.4
Surface Soil Total											1.5E-05					0.4
											1.5E-05					0.4
							Total of Receptor Risks Across All Media				**1.5E-05**	**Total of Receptor Hazards Across All Media**				**0.4**

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TABLE 7.1.RME (Property F)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult (> 18)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Arsenic (inorganic)	13.0	mg/kg	7.6E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.1E-06	0.000009	mg/kg day	0.0003	mg/kg day	0.03
				Chromium (VI)	18	mg/kg	1.1E-06	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	5.3E-06	0.00001	mg/kg day	0.003	mg/kg day	0.004
				PCBs	0.26	mg/kg	1.5E-08	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	3.1E-08	0.0000002	mg/kg day	0.00002	mg/kg day	0.01
			Exp. Route Total								6.5E-06					0.04
		Residence	Dermal	PCBs	0.26	mg/kg	2.4E-09	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	4.9E-09	0.00000003	mg/kg day	0.00002	mg/kg day	0.001
				Arsenic (inorganic)	13.0	mg/kg	2.6E-08	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	3.9E-08	0.0000003	mg/kg day	0.0003	mg/kg day	0.001
			Exp. Route Total								4.4E-08					0.002
		Residence	Inhalation (Fugitive Dust)	Arsenic (inorganic)	13.0	mg/kg	7.6E-07	ug/m3	4.3E-03	(ug/m3)$^{-1}$	3.3E-09	0.000000009	ug/m3	0.000015	mg/m3	0.0006
				Chromium (VI)	18.0	mg/kg	1.1E-06	ug/m3	8.4E-02	(ug/m3)$^{-1}$	8.9E-08	0.00000001	ug/m3	0.0001	mg/m3	0.0001
				PCBs	0.26	mg/kg	1.5E-08	ug/m3	5.7E-04	(ug/m3)$^{-1}$	8.7E-12	0.0000000002	ug/m3	0.00007	mg/m3	0.000003
			Exp. Route Total								9.2E-08					0.0007
		Exposure Point Total									6.6E-06					0.05
	Exposure Medium Total										6.6E-06					0.05
Surface Soil Total											6.6E-06					0.05
											6.6E-06					0.05
							Total of Receptor Risks Across All Media				**6.6E-06**	**Total of Receptor Hazards Across All Media**				**0.05**

TABLE 10.1.RME (Property F)

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Futrue
Receptor Population: Residents
Receptor Age: Child and Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (0 to 0.17 Feet	Surface Soil (0 to 0.17 Feet	Surface Soil (0 to 0.17 Feet	Arsenic (inorganic)	1.3E-05	3.3E-09	2.2E-07		1.3E-05	Hyperpigmentation, keratosis and possible vascular complications	0.33	0.0006	0.05	0.38
		Child	Chromium (VI) (1 to < 2)	3.3E-05	3.0E-07			3.3E-05	none	0.08	0.0001		0.08
			Chromium (VI) (2 to 6)	2.0E-05	1.8E-07			2.0E-05	none	0.08	0.0001		0.08
			Chromium (VI) (6 to < 16)	5.3E-06	4.4E-07			5.7E-06	none	0.01	0.0001		0.01
			PCBs	5.7E-07	8.7E-12	1.8E-06		2.4E-06	immune system	0.17	0.000003	0.07	0.23
			Chemical Total	7.1E-05	9.2E-07	2.0E-06		7.4E-05		0.7	0.0009	0.11	0.8
		Exposure Point Total						7.4E-05					0.8
	Exposure Medium Total Child							7.4E-05					0.8
		Surface Soil (0 to 0.17 Feet	Arsenic (inorganic)	9.2E-06	1.3E-08	1.1E-06		1.0E-05	Hyperpigmentation, keratosis and possible vascular complications	0.06	0.0006	0.01	0.07
		Adult	Chromium	2.5E-06	2.1E-07			2.7E-06	none	0.01	0.0001		0.01
			PCBs	2.4E-07	3.5E-11	1.4E-07		3.8E-07	immune system	0.02	0.00000300	0.01	0.03
			Chemical Total	1.2E-05	2.2E-07	1.2E-06		1.3E-05		0.09	0.0007	0.02	0.11
		Exposure Point Total						1.3E-05				Child	0.8
	Exposure Medium Total							8.8E-05				Adult	0.1
Medium Total													
Receptor Total							Receptor Risk Total	1.6E-04				Child Receptor HI Total	0.8
Receptor Total							Receptor Risk Total	2E-04				Adult Receptor HI Total	0.1

TABLE 10.2. CTE (Property F)

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe:	Current/Futrue
Receptor Population:	Residents
Receptor Age:	Child and Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil (0 to 0.17 Feet	Surface Soil (0 to 0.17 Feet	Surface Soil (0 to 0.17 Feet	Arsenic (inorganic)	3.2E-06	1.6E-09	1.80E-07		3.4E-06	Hyperpigmentation, keratosis and possible vascular complications	0.17	0.0006	0.01	0.18
		Child	Chromium (VI) (1 to < 2)	8.2E-06	1.5E-07			8.4E-06	No Observed Adverse Effect Level	0.04	0.0001		0.04
			Chromium (VI) (2 to 6)	2.5E-06	4.4E-08			2.5E-06	No Observed Adverse Effect Level	0.04	0.0001		0.04
			Chromium (VI) (6 to < 16)	2.6E-07	4.4E-08			3.0E-07	No Observed Adverse Effect Level	0.00	0.0001		0.00
			PCBs	1.4E-07	4.4E-12	2.2E-08		1.6E-07	immune system	0.08	0.000003	0.01	0.09
			Chemical Total	1.4E-05	2.4E-07	2.0E-07		1.5E-05		0.3	0.001	0.02	0.35
		Exposure Point Total						1.5E-05					0.4
	Exposure Medium Total Child							1.5E-05					0.4
		Surface Soil (0 to 0.17 Feet	Arsenic (inorganic)	1.1E-06	3.3E-09	3.9E-08		1.1E-06	Hyperpigmentation, keratosis and possible vascular complications	0.03	0.0006	0.001	0.03
		Adult	Chromium	5.3E-06	8.9E-08			5.4E-06	No Observed Adverse Effect Level	0.004	0.0001		0.004
			PCBs	3.1E-08	8.7E-12	4.9E-09		3.6E-08	immune system	0.01	0.000003	0.001	0.01
			Chemical Total	6.4E-06	9.2E-08	4.4E-08		6.6E-06		0.04	0.001	0.002	0.05
		Exposure Point Total						6.6E-06				Child	0.35
	Exposure Medium Total											Adult	0.05
Medium Total													
Receptor Total											Child Receptor HI Total		0.4
Receptor Total						Receptor Risk Child and Adult Total		2E-05			Adult Receptor HI Total		0.05

TABLE 1.1 (Property G)
SELECTION OF EXPOSURE PATHWAYS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe	Media	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Soil (< 1.3 Feet)	Surface Soil (< 1.3 Feet)	Residence (Property G)	Resident	Adult	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
			Residence (Property G)	Resident	Young Child (1 to 6 years of age) and (6 to < 16 years for chemicals with a Mutagenic Mode of Action)	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Dermal Contact	Quantitative	
						Inhalation of Fugitive Dust	Quantitative	
Future	Subsurface Soil (4 Feet or greater)	Subsurface Soil (4 Feet or greater)	Residence (Property G)	Construction/ Utility Worker	Adult	Ingestion	Qualitative	This pathway is evaluated qualitative based on a lack of data on chemical concentrations at depth.
						Inhalation of Fugitive Dust	Qualitative	
						Dermal Contact	Qualitative	

TABLE 2.1 (Property G)
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Summary of Metal Chemicals of Potential Concern
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 1.3 Feet)
Exposure Medium: Surface Soil (< 1.3 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)		Maximum Concentration (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (< 1.3 Feet)	7429-90-5	Aluminum	8710		8710		mg/kg	SB-15	1/1	8710	8710		7,700 (Noncancer)			Y	ASL
(Property G)	7440-38-2	Arsenic (inorganic)	6.8		16.8	EN	mg/kg	SS-31	3/3	6.8 - 16.8 EN	16.8	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	22.2		22.2		mg/kg	SB-15	1/1	22.2	22.2	NA	0.29 (Cancer)			Y	ASL
	7440-48-4	Cobalt	6.6	E	6.6	E	mg/kg	SB-15	1/1	6.6 E	6.6 E	NA	2.3 (Noncancer)			Y	ASL
	7439-89-6	Iron	53100		53100		mg/kg	SB-15	1/1	53,100	53,100	NA	5500 (Noncancer)			Y	ASL
	7439-96-5	Manganese	444	N	444	N	mg/kg	SB-15	1/1	444 N	444 N	NA	180 (Noncancer)			Y	BSL
	7440-28-0	Thallium (Soluble Salts)	0.8	BN	0.8	BN	mg/kg	SB-15	1/1	0.8 BN	0.8 BN	NA	0.078 (Noncancer)			Y	ASL

(1) Maximum Concentration of all samples used as screening level.
(2) Screening Toxicity Concentration is based on the lowest concentration in soil associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the assessment (http://www.epa.gov/region9/superfund/prg/).

Definitions
ARAR - Applicable or Relevant and Appropriate Requirements
TBC - To Be Considered Values
COPC - Chemical of Potential Concern
ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantitation limit.
(E) Estimated concentration due to the presence of intereference (inorganics)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

TABLE 2.2 (Property G)
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 1.3 Feet)
Exposure Medium: Surface Soil (< 1.3 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)		Maximum Concentration (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (< 1.3 Feet) (Property G)	1336-36-3	Total PCBs	0.032	J	0.1	J	mg/kg	SS-31	3/3	0.032 J - 0.1 J	0.1 (J)	NA	0.2 (Cancer)			N	BSL
	7429-90-5	Aluminum	8710		8710		mg/kg	SB-15	1/1	8710	8710		7,700 (Noncancer)			Y	ASL
	7440-36-0	Antimony (metallic)	0.6	BN	0.6	BN	mg/kg	SB-15	1/1	0.6 BN	0.6 BN	NA	31 (Noncancer)			N	BSL
	7440-38-2	Arsenic (inorganic)	6.8		26.4	EN	mg/kg	SS-31	3/3	6.8 - 16.8 EN	16.8	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
	7440-39-3	Barium	127		127		mg/kg	SB-15	1/1	127	127	NA	15000 (Noncancer)			N	BSL
	7440-41-7	Beryllium	0.48	BN	0.48	BN	mg/kg	SB-15	1/1	0.48 BN	0.48 BN	NA	16 (Noncancer)			N	BSL
	7440-43-9	Cadmium	1.9	N	1.9	N	mg/kg	SB-15	1/1	1.9 N	1.9 N	NA	7 (Noncancer)			N	BSL
	18540-29-9	Chromium (VI)	22.2		22.2		mg/kg	SS-15	1/1	22.2	22.2	NA	0.29 (Cancer)			Y	ASL
	7440-48-4	Cobalt	6.6	E	6.6	E	mg/kg	SB-15	1/1	6.6 E	6.6 E	NA	2.3 (Noncancer)			Y	ASL
	7440-50-8	Copper	32.2	N	59.4	EN	mg/kg	SS-31	3/3	59.4	59.4	NA	310 (Noncancer)			N	BSL
	7439-89-6	Iron	53100		53100		mg/kg	SB-15	1/1	53,100	53,100	NA	5500 (Noncancer)			Y	ASL
	7439-92-1	Lead	101		184	E	mg/kg	SS-15	4/4	1801 - 184 (E)	184	NA	400			N	BSL
	7439-96-5	Manganese	444	N	444	N	mg/kg	SB-15	1/1	444 N	444 N	NA	180 (Noncancer)			Y	BSL
	7439-97-6	Mercury	0.663	N	0.663	N	mg/kg	SB-15	1/1	0.663 N	0.633 N	NA	1 (Noncancer)			N	BSL
	7440-02-0	Nickel (Soluble Salts)	21.2	E	21.2	E	mg/kg	SB-15	1/1	21.2 E	21.2 E	NA	150 (Noncancer)			N	BSL
	7782-49-2	Selenium	3.5	BN	3.5	BN	mg/kg	SB-15	1/1	3.5 BN	3.5 BN	NA	39 (Noncancer0			N	BSL
	7440-22-4	Silver	0.38	BN	0.38	BN	mg/kg	SB-15	1/1	0.38 BN	0.38 BN	NA	39 (Noncancer)			N	BSL
	7440-28-0	Thallium (Soluble Salts)	0.8	BN	0.8	BN	mg/kg	SB-15	1/1	0.8 BN	0.8 BN	NA	0.078 (Noncancer)			Y	ASL
	NA	Vanadium and Compounds	18.5	E	18.5	E	mg/kg	SB-15	1.1	18.5 E	18.5 E	NA	39 (Noncancer)			N	BSL
	7440-66-6	Zinc	194	EN	791	N	mg/kg	SS-15	3/3	791 EN	791 EN	NA	2,300 (Noncancer)			N	BSL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on the lowest concentration in soil associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The May 2013 Regional Screening Level Tables were used in the assessment (http://www.epa.gov/region9/superfund/prg/).

Definitions
ARAR - Applicable or Relevant and Appropriate Requirements
TBC - To Be Considered Values
COPC - Chemical of Potential Concern
ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantitation limit.
(E) Estimated concentration due to the presence of intereference (inorganics)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

TABLE 3.1.RME (Property G)

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Medium: Soil (< 1.3 Feet)
Exposure Medium: Soil (< 1.3 Feet)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Surface Soil (< 1.3 Feet)	Aluminum	mg/kg			8710	8710	mg/kg	Maximum - only 1 Value	ProUCL 4.1
	Arsenic (inorganic)	mg/kg			26.4 (N)	26.4	mg/kg	Maximum - only 3 Distinct Values in	ProUCL 4.1
	Chromium (VI)	mg/kg			22.2	22.2	mg/kg	Maximum - only 3 Distinct Values in this data	ProUCL 4.1
	Cobalt	mg/kg			6.6 (E)	6.6	mg/kg	Maximum - only 1 Value	ProUCL 4.1
	Iron	mg/kg			53,100	53,100	mg/kg	Maximum - only 1 Value	ProUCL 4.1
	Manganese	mg/kg			444 N	444	mg/kg	Maximum - only 1 Value	ProUCL 4.1

Table 3.2 - Summary of Data and Sample Locations for Property G

Chemicals	SS-31		SS-32		SB-15		SB-15		
PCBs	0.073	J	0.1	J	0.032	J			
Arsenic	5.3	N	26.4	N			6.8	BN	
Chromium (VI)	14.5	EN	16.8	EN			22.2		<u>Lead</u>
Copper	32.2	EN	59.4	EN			54.3		<u>Average</u>
Lead	101	EN	184	E			142	N	142.3
Zinc	194	EN	227	E			791	N	

Table 3.3. Summary of Data and Sample Locations - Property G

	SB-15		Lead
Aluminum	8710		
Antimony (metallic)	0.6	BN	184
Barium	127		142
Beryllium	0.48	BN	101
Cadmium	1.9	N	Average Lead Concentration
Cobalt	6.6	E	142.3
Copper	54.3		
Iron	53100		
Manganese	444	N	
Mercury	0.633	N	
Nickel (Soluble Salts)	21.2	E	
Selenium	3.5	BN	
Silver	0.38	BN	
Thallium (Soluble Salts)	0.8	BN	
Vanadium and Compounds	18.5	E	

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.1.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	6	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	6	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - FOR CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.2.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (2 years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (4 years)	1460	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.97	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.3.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	10	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	3650	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 Years)	10	years	EPA1991 and 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION CHEMICALS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.4.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA1991	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.5 .RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 1991	

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USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response,
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TABLE 4.6. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1999	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resdent	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.6.CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (3 years)	1095	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

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TABLE 4.7 CTE (MMOA)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHILD MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	year	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	year	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.7.CTE MMOA (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE -CHEMICALS WITH MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (3 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 2002	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - C *CF
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 2002	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.8 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	Mean of IR	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Speicfic	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	yrs	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.8 CTE MMOA for Child (6 to < 16 Years) (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD (6 TO < 16 YEARS) MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (1 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 4.9. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemcial Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

'(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.9 CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	---
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	---
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor (1)	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.10 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aluminum	Chronic	1E+00	mg/kg-day	1E+00	NA	mg/kg-day	in the offspring of mice	100	PPRTV	03/11/13
Arsenic (inorganic)	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Hyperpigmentation, keratosis and possible vascular complications	3	IRIS	03/11/13
Chromium (VI)	Chronic	3E-03	mg/kg-day	1E+00	3E-03	mg/kg-day	None reported.	300	IRIS	03/11/13
Cobalt	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	decreased iodine uptake in humans	3,000	PPRTV	03/11/13
Iron	Chronic	7E-01	mg/kg-day	1E+00	7E-01	mg/kg-day	LOAEL	1.5	PPRTV	03/11/13
Manganese	Chronic	1E-01	mg/kg-day	1E+00	1E-01	mg/kg-day	CNS effects (other effect: Impairment of neurobehavioral function.)	1	IRIS	03/11/13

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aluminum	Chronic	5.0E-03	mg/m3			neurotoxic effect	3E+02	PPRTV	03/11/13
Arsenic (inorganic)	Chronic	1.5E-05	mg/m3			Development; cardiovascular system; nervous system; lung; skin Development; cardiovascular system; nervous system; lung; skin	Not Listed	CalEPA	03/11/13
Chromium (VI)	Chronic	1E-04	mg/m3			Lactate dehydrogenase in bronchioalveolar lavage fluid	300	IRIS	03/11/13
Cobalt	Chronic	6E-06	mg/m3			NOAEL (Adjusted)	300	PPRTV	03/11/13
Iron		NA							
Manganese	Chronic	5E-05	mg/m3			Impairment of neurobehavioral function (other effect: Impairment of neurobehavioral function.	1,000	IRIS	03/11/13

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units	(1)	Value (2)	Units		Source(s)	Date(s) (MM/DD/YYYY)
Aluminum	NA					inadequate information to assess carcinogenic potential	PPRTV	03/13/2013
Arsenic (inorganic)	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/13/2013
Chromium (VI)	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	5.0E-01	$(mg/kg\text{-}day)^{-1}$	A	NJDEP/CalEPA	03/13/2013
Cobalt	NA						PPRTV	03/13/2013
Iron	NA							
Manganese	NA							

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

(2) Based on oral cancer slope factor for Dermal exposure, if an absorption factor has been applied

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value (1)	Units		Source(s)	Date(s) (MM/DD/YYYY)
Aluminum	NA						
Arsenic (inorganic)	4.3E-03	$(ug/m3)^{-1}$			A	IRIS	03/13/2013
Chromium (VI)	8.4E-02	$(ug/m3)^{-1}$			A	NJDEP/CalEPA	03/13/2013
Cobalt	9.0E-03	$(ug/m3)^{-1}$				PPRTV	04/21/09
Iron	NA						
Lead	NA						
Manganese	NA						

A = Known Human Carcinogens

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

(1) Based on IRIS file inhalation cancer slope factor for dust or aerosol inhalation

(2) Based on IRIS recommendation when addressing Inhalation of evaporated congeners

TABLE 7.1.RME (Property G)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Surface Soil	Surface Soil	Residence	Ingestion	Aluminum	8710	mg/kg	9.5E-03	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$		0.1	mg/kg day	1.0	mg/kg day	0.11
(< 1.3 feet)		Property G		Arsenic (inorganic)	26.4	mg/kg	1.7E-05	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-05	0.0002	mg/kg day	0.0003	mg/kg day	0.7
				Chromium (VI) (< 2)	22.2	mg/kg	8.1E-06	mg/kg day	5.0E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-05	0.0003	mg/kg day	0.003	mg/kg day	0.09
				Chromium (VI) (2 to 6)	22.2	mg/kg	1.6E-05	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-05	0.0003	mg/kg day	0.003	mg/kg day	0.09
				Chromium (VI) (6 to < 16 yrs)	22.2	mg/kg	4.3E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-06	0.00003	mg/kg day	0.003	mg/kg day	0.01
				Cobalt	6.6	mg/kg	7.2E-06	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$		0.00008	mg/kg day	0.0003	mg/kg day	0.28
				Iron	53100	mg/kg	5.8E-02	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$		0.7	mg/kg day	0.7	mg/kg day	0.97
				Manganese	444	mg/kg	4.9E-04	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$		0.006	mg/kg day	0.014	mg/kg day	0.41
			Exp. Route								9.7E-05					2.6
		Residence	Dermal	Arsenic (inorganic)	26.4	mg/kg	2.4E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.6E-06	2.8E-05	mg/kg day	0.0003	mg/kg day	0.09
			Exp. Route								3.6E-06					0.1
		Residence	Inhalation (Fugitive Dust)	Aluminum	8710	mg/kg	5.1E-04	ug/m3	NA	$(ug/m3)^{-1}$		6.0E-06	mg/m3	0.005	mg/m3	0.001
				Arsenic (inorganic)	26.4	mg/kg	1.5E-06	ug/m3	4.3E-03	$(ug/m3)^{-1}$	6.7E-09	1.8E-08	mg/m3	0.00002	mg/m3	0.0012
				Chromium (VI) (< 2 years)	22.2	mg/kg	4.3E-07	ug/m3	8.4E-01	$(ug/m3)^{-1}$	3.6E-07	1.5E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6)	22.2	mg/kg	8.7E-07	ug/m3	2.52E-01	$(ug/m3)^{-1}$	2.2E-07	1.5E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to < 16 yrs)	22.2	mg/kg	2.2E-06	ug/m3	2.52E-01	$(ug/m3)^{-1}$	5.5E-07	1.5E-08	mg/m3	0.0001	mg/m3	0.0002
				Cobalt	6.6	mg/kg	3.9E-07	ug/m3	9.0E-03	$(ug/m3)^{-1}$	3.5E-09	4.5E-09	mg/m3	0.000006	mg/m3	0.0008
				Iron	53100	mg/kg	3.1E-03	ug/m3	NA	$(ug/m3)^{-1}$		3.6E-05	mg/m3	NA	mg/m3	
				Manganese	444	mg/kg	2.6E-05	ug/m3	NA	$(ug/m3)^{-1}$		3.0E-07	mg/m3	0.000050	mg/m3	0.006
			Exp. Route								1.1E-06					0.01
		Exposure Point Total									1.0E-04					2.7
	Exposure Medium Total										1.0E-04					2.7
face Soil Total											1.0E-04					2.7
											1.0E-04					2.7
							Total of Receptor Risks Across All Media				**1E-04**	**Total of Receptor Hazards Across All Media**				**3**

R2-0014711

TABLE 7.2.RME (Property G)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence	Ingestion	Aluminum	8710	mg/kg	4.1E-03	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.01	mg/kg day	1.0	mg/kg day	0.01
(< 1.3 feet)		(Property G)		Arsenic (inorganic)	26.4	mg/kg	7.4E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.1E-05	0.00002	mg/kg day	0.0003	mg/kg day	0.07
				Chromium (VI)	22.2	mg/kg	6.1E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	3.0E-06	0.00003	mg/kg day	0.003	mg/kg day	0.01
				Cobalt	6.6	mg/kg	3.1E-06	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.00001	mg/kg day	0.0003	mg/kg day	0.03
				Iron	53100	mg/kg	5.0E-02	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.07	mg/kg day	0.7	mg/kg day	0.10
				Manganese	444	mg/kg	2.1E-04	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.001	mg/kg day	0.014	mg/kg day	0.04
			Exp. Route Total								1.4E-05					0.3
		Residence	Dermal	Arsenic (inorganic)	26.4	mg/kg	1.5E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.2E-06	4.3E-06	mg/kg day	0.0003	mg/kg day	0.01
			Exp. Route Total								2.2E-06					0.01
		Residence	Inhalation (Fugitive Dust)	Aluminum	8710	mg/kg	2.0E-03	ug/m3	NA	$(ug/m3)^{-1}$		6.0E-06	mg/m3	0.005	mg/m3	0.001
				Arsenic (inorganic)	16.8	mg/kg	3.9E-06	ug/m3	4.3E-03	$(ug/m3)^{-1}$	1.7E-08	1.2E-08	mg/m3	0.00002	mg/m3	0.0008
				Chromium (VI)	26.4	mg/kg	6.2E-06	ug/m3	8.4E-02	$(ug/m3)^{-1}$	5.2E-07	1.8E-08	mg/m3	0.0001	mg/m3	0.0002
				Cobalt	6.6	mg/kg	1.5E-06	ug/m3	9.0E-03	$(ug/m3)^{-1}$	1.4E-08	4.5E-09	mg/m3	0.000006	mg/m3	0.0008
				Iron	53100	mg/kg	1.2E-02	ug/m3	NA	$(ug/m3)^{-1}$		3.6E-05		NA		
				Manganese	444	mg/kg	1.0E-04	ug/m3	NA	$(ug/m3)^{-1}$		3.0E-07	mg/m3	0.00005	mg/m3	0.006
			Exp. Route Total								5.5E-07					0.009
		Exposure Point Total									1.7E-05					0.3
	Exposure Medium Total										1.7E-05					0.3
urface Soil Total											1.7E-05					0.3
											1.7E-05					0.3
							Total of Receptor Risks Across All Media				**1.7E-05**	**Total of Receptor Hazards Across All Media**				**0.3**

R2-0014712

TABLE 7.3.CTE (Property G)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	ntake/Exposure Concentratio		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (< 1.3 feet)	Surface Soil	Residence	Ingestion	Aluminum	8710	mg/kg	2.4E-03	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$		0.1	mg/kg day	1.0	mg/kg day	0.06
				Arsenic (inorganic)	26.4	mg/kg	4.3E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-06	0.0001	mg/kg day	0.0003	mg/kg day	0.3
				Chromium (VI) (< 2)	22.2	mg/kg	2.0E-06	mg/kg day	5.0E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-05	0.0001	mg/kg day	0.003	mg/kg day	0.05
				Chromium (VI) (2 to 6)	22.2	mg/kg	2.0E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-06	0.0001	mg/kg day	0.003	mg/kg day	0.05
				Chromium (VI) (6 to < 16 yrs)	22.2	mg/kg	4.3E-07	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-07	0.00003	mg/kg day	0.003	mg/kg day	0.01
				Cobalt	6.6	mg/kg	1.8E-06	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$		0.00004	mg/kg day	0.0003	mg/kg day	0.14
				Iron	53100	mg/kg	1.5E-02	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$		0.3	mg/kg day	0.7	mg/kg day	0.48
				Manganese	444	mg/kg	1.2E-04	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$		0.003	mg/kg day	0.014	mg/kg day	0.2
			Exp. Route Total								2.0E-05					1.3
		Residence	Dermal	Arsenic (inorganic)	26.4	mg/kg	1.2E-06	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-06	1.4E-06	mg/kg day	0.0003	mg/kg day	0.005
			Exp. Route Total								1.8E-06					0.005
		Residence	Inhalation (Fugitive Dust)	Aluminum	8710	mg/kg	2.6E-04	ug/m3	NA	$(ug/m3)^{-1}$		6.0E-06	mg/m3	0.005	mg/m3	0.001
				Arsenic (inorganic)	26.4	mg/kg	7.7E-07	ug/m3	4.3E-03	$(ug/m3)^{-1}$	3.3E-09	1.8E-08	mg/m3	0.00002	mg/m3	0.0012
				Chromium (VI) (< 2 years)	22.2	mg/kg	2.2E-07	ug/m3	8.4E-01	$(ug/m3)^{-1}$	1.8E-07	1.5E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6)	22.2	mg/kg	2.2E-07	ug/m3	2.52E-01	$(ug/m3)^{-1}$	5.5E-08	1.5E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to < 16 yrs)	22.2	mg/kg	2.2E-07	ug/m3	2.52E-01	$(ug/m3)^{-1}$	5.5E-08	1.5E-08	mg/m3	0.0001	mg/m3	0.0002
				Cobalt	6.6	mg/kg	1.9E-07	ug/m3	9.0E-03	$(ug/m3)^{-1}$	1.7E-09	4.5E-09	mg/m3	0.000006	mg/m3	0.0008
				Iron	53100	mg/kg	1.6E-03	ug/m3	NA	$(ug/m3)^{-1}$		3.6E-05		NA		
				Manganese	444	mg/kg	1.3E-05	ug/m3	NA	$(ug/m3)^{-1}$		3.0E-07	mg/m3	0.000050	mg/m3	0.006
			Exp. Route Total								3.0E-07					0.010
		Exposure Point Total									2.2E-05					1.3
	Exposure Medium Total										2.2E-05					1.3
ırface Soil Total											2.2E-05					1.3
											2.2E-05					1.3
							Total of Receptor Risks Across All Media				**2E-05**	**Total of Receptor Hazards Across All Media**				**1**

R2-0014713

TABLE 7.4.CTE (Property G)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Surface Soil (< 1.3 Feet)	Surface Soil (< 1.3 Feet)	Residence	Ingestion	Aluminum	8710	mg/kg	5.1E-04	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.01	mg/kg day	1.0	mg/kg day	0.01
				Arsenic (inorganic)	26.4	mg/kg	1.5E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.3E-06	0.00001	mg/kg day	0.0003	mg/kg day	0.04
				Chromium (VI)	22.2	mg/kg	1.3E-06	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	6.5E-07	0.00002	mg/kg day	0.003	mg/kg day	0.01
				Cobalt	6.6	mg/kg	3.9E-07	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.000005	mg/kg day	0.0003	mg/kg day	0.02
				Iron	53100	mg/kg	3.1E-03	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.04	mg/kg day	0.7	mg/kg day	0.1
				Manganese	444	mg/kg	2.1E-04	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.0003	mg/kg day	0.014	mg/kg day	0.02
			Exp. Route Total								3.0E-06					0.1
			Dermal	Arsenic (inorganic)	26.4	mg/kg	5.3E-08	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	8.0E-08	6.2E-07	mg/kg day	0.0003	mg/kg day	0.002
			Exp. Route Total								8.0E-08					0.002
			Inhalation (Fugitive Dust)	Aluminum	8710	mg/kg	5.1E-04	ug/m3	NA	(ug/m3)$^{-1}$		6.0E-06	mg/m3	0.005	mg/m3	0.001
				Arsenic (inorganic)	26.4	mg/kg	1.5E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	6.7E-09	1.8E-08	mg/m3	0.00002	mg/m3	0.0012
				Chromium (VI)	22.2	7E+00	1.3E-06	ug/m3	8.4E-02	(ug/m3)$^{-1}$	1.1E-07	1.5E-08	mg/m3	0.0001	mg/m3	0.0002
				Cobalt	6.6	mg/kg	3.9E-07	ug/m3	9.0E-03	(ug/m3)$^{-1}$	3.5E-09	4.5E-09	mg/m3	0.000006	mg/m3	0.0008
				Iron	53100	mg/kg	3.1E-03	ug/m3	NA	(ug/m3)$^{-1}$		3.6E-05		NA		
				Manganese	444	mg/kg	2.6E-05	ug/m3	NA	(ug/m3)$^{-1}$		3.0E-07	mg/m3	0.00005	mg/m3	0.006
			Exp. Route Total								1.2E-07					0.009
		Exposure Point Total									3.2E-06					0.1
	Exposure Medium Total										3.2E-06					0.1
rface Soil Total											3.2E-06					0.1
											3.2E-06					0.1
							Total of Receptor Risks Across All Media				**3E-06**	**Total of Receptor Hazards Across All Media**				**0.1**

R2-0014714

TABLE 10.1.RME (Property G)

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe:	Current/Future
Resident Adult and Child	
Receptor Age:	Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Residence Property G Child	Aluminum						minimal neurotoxicity	0.11	0.001		0.11
			Arsenic (inorganic)	2.6E-05	6.7-09	3.60E-06		3.0E-05	hyperpigmentation	0.7	0.0012	0.06	0.76
			Chromium (VI) (< 2)	4.1E-05	3.6E-07			4.1E-05	NOAEL	0.09	0.0002		0.09
			Chromium (VI) (2 to 6)	2.4E-05	2.2E-07			2.5E-05	NOAEL	0.09	0.0002		0.09
			Chromium (VI) (6 to < 16 yrs)	6.5E-06	5.5E-07			7.1E-06	NOAEL	0.01	0.0002		0.01
			Cobalt		3.5E-09			3.5E-09	decreased iodine uptake	0.28	0.0008		0.28
			Iron						LOAEL	0.97			0.97
			Manganese						CNS effects	0.41	0.006		0.42
			Chemical Total	9.7E-05	1.1E-06	3.6E-06		1.0E-04		2.7	0.01	6.0E-02	3
		Exposure Point Total											
	Exposure Medium Total												
		Residence Property G Adult	Aluminum						minimal neurotoxicity	0.01	0.001		0.01
			Arsenic (inorganic)	1.1E-05	1.7E-08	2.2E-06		1.3E-05	hyperpigmentation	0.07	0.0008	0.01	0.08
			Chromium (VI)	3.0E-06	5.2E-07			3.6E-06	NOAEL	0.01	0.0002		0.01
			Cobalt		1.4E-08			1.4E-08	decreased iodine uptake	0.03	0.0006		0.03
			Iron						LOAEL	0.1			0.10
			Manganese						CNS effects	0.04	0.006		0.046
			Chemical Total	1.4E-05	5.5E-07	2.2E-06		1.7E-05		0.3	0.009	0.01	0.3
		Exposure Point Total											
	Exposure Medium Total												
Medium Total													
Medium Total												Child HI Total	3
Receptor Total						Child and Adult Risk Total		1E-04				Adult HI Total	0.3

HI Total (LOAEL)	0.97
HI (Hyperpigmentation)	0.8
HI (CNS)	0.42

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TABLE 10.2 CTE (Property G)

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Resident Adult and Child
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Residence Property G Child	Aluminum						minimal neurotoxicity	0.06	0.001		0.06
			Arsenic (inorganic)	6.5E-06	3.3E-09	1.80E-06		8.3E-06	hyperpigmentation	0.3	0.0012	0.005	0.31
			Chromium (VI) (< 2)	1.0E-05	1.8E-07			1.0E-05	NOAEL	0.05	0.0002		0.05
			Chromium (VI) (2 to 6)	3.0E-06	5.5E-08			3.1E-06	NOAEL	0.05	0.0002		0.05
			Chromium (VI) (6 to < 16 yrs)	6.5E-07	5.5E-08			7.1E-07	NOAEL	0.01	0.0002		0.01
			Cobalt		1.7E-09			1.7E-09	decreased iodine uptake	0.1	0.0008		0.14
			Iron						LOAEL	0.5			0.5
			Manganese						CNS effects	0.2	0.006		0.2
			Chemical Total	2.0E-05	3.0E-07	1.8E-06		2.2E-05		1.3	0.01	0.005	1
		Exposure Point Total											
	Exposure Medium Total												
		Residence Property G	Aluminum						minimal neurotoxicity	0.01	0.001		0.01
			Arsenic (inorganic)	2.3E-06	6.7E-09	8.00E-08		2.4E-06	hyperpigmentation	0.04	0.0012	0.002	0.04
			Chromium (VI)	6.5E-07	1.1E-07			7.6E-07	NOAEL	0.01	0.0002		0.01
			Cobalt		3.5E-09			3.5E-09	decreased iodine uptake	0.02	0.001		0.02
			Iron						LOAEL	0.1			0.10
			Manganese						CNS effects	0.02	0.006		0.026
			Chemical Total	3.0E-06	1.2E-07	8.0E-08		3.2E-06		0.2	0.003	0.002	0.21
		Exposure Point Total											
	Exposure Medium Total												
Medium Total													
Medium Total											Adult HI Total		0.2
Receptor Total						Adult and Child Risk Total		3E-05			Child HI Total		2

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TABLE 1.1 (Property H)
SELECTION OF EXPOSURE PATHWAYS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe	Media	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current / Future	Surface Soil (0 to 1.6 Feet)	Surface Soil (0 to 1.6 Feet)	Residence (Property H)	Resident	Adult	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
			Residence (Property H)	Resident	Young Child (1 to 6 years of age) and birth to < 16 years for Chemicals Evaluated Based on Mutagenic Mode of Action.	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
Future	Subsurface Soil	Subsurface Soil	Residence (Property H)	Construction/ Utility Worker	Adult	Ingestion	Qualitative	This pathway is evaluated qualitative based on a lack of data on chemical concentrations at depth.
						Inhalation of Fugitive Dust	Qualitative	
						Dermal Contact	Qualitative	

TABLE 2.2 (Property H)

Full ANALYSIS OF OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 1.6 Feet)
Exposure Medium: Surface Soil (< 1.6 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration	(Qualifier)	Maximum Concentration	(Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property H)																	
PCBs																	
	1336-36-3	Total PCBs	0.09	ND	8		mg/kg	SS-9	4/8		8.00	NA	0.2 (Cancer)			Y	ASL
Semi-Volatile Organic Compounds																	
	56-55-3	Benzo(a)anthracene	0.016	J	6.8	J	mg/kg	SB-19	3/3		6.8	NA	0.15 (Cancer)			Y	ASL
	50-32-8	Benzo(a)pyrene	0.4	ND	7.7		mg/kg	SB-19	3/3		7.7	NA	0.015 (Cancer)			Y	ASL
	205-99-2	Benzo(b)fluoroanthene	0.019	J	8.4		mg/kg	SB-19	3/3		8.4	NA	0.15 (Cancer)			Y	ASL
	207-08-9	Benzo(k)fluoroanthene	0.65	J	3.1	J	mg/kg	SB-19	3/3		3.1	NA	1.5 (cancer)			Y	ASL
	53-70-3	Dibenzo(ah(anthracene	0.31	J	1.9	J	mg/kg	SB-19	3/3		1.9	NA	0.015 (Cancer)			Y	ASL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.4	ND	6.1	J	mg/kg	SB-19	3/3		6.1	NA	0.15 (Cancer)			Y	ASL
	129-00-0	Pyrene	0.033	J	8.7		mg/kg	SB-19	3/3		8.7	NA	3.2 (Cancer)			Y	ASL
Metals																	
	7440-38-2	Arsenic (inorganic)	7.5		19.6		mg/kg	SB-19	9/9		66.5	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	5.8		39.1	SB	mg/kg	SB-19	9/9		39.1	NA	0.29 (Cancer)			Y	ASL
	7440-48-4	Cobalt	2.4	B	4.3	BE	mg/kg	SB-19	3/3		4.3 BE	NA	2.3 (Noncancer)			Y	ASL
	7439-89-6	Iron	15600	N	28000	N	mg/kg	SB-17	3/3		28000 N	NA	5,500 (Noncancer)			Y	ASL
	7439-92-1	Lead	10.7	N	1160	E	mg/kg	SB-19	3/3		1160	NA	400			Y	ASL
	7440-28-0	Thallium (Soluble Salts)	0.066	ND	0.75	B	mg/kg	SB-19	2/3		0.75 B	NA	0.078 (Noncancer)			Y	ASL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The comparison vlaues were obtained from the May 2013 Regional Screening Levels (http://www.epa.gov/region9/superfund/prg/).

Definitions

ARAR - Applicable or Relevant and Appropriate Requirements
TBC - To Be Considered Values
COPC - Chemical of Potential Concern
ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantitation limit.
(E) Estimated concentration due to the presence of intereference (inorganics)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

TABLE 2.2 (Property H)

Full ANALYSIS OF OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 1.6 Feet)
Exposure Medium: Surface Soil (< 1.6 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)		Maximum Concentration (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (N/C) (2,3,4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property H)																	
								PCBs									
	1336-36-3	Total PCBs	0.09	ND	8		mg/kg	SS-9	4/8		8.00	NA	0.2 (Cancer)			Y	ASL
								Semi-Volatile Organic Compounds									
	91-57-6	**2-methyl napthalene**	**0.13**	**J**	0.13		mg/kg	SB-17			0.13		**23 (Noncancer)**			**N**	**BSL**
	208-96-8	Acenaphthylene	0.34	J	2.8	J	mg/kg	SB-19	3/3		2.8	NA	NA			N	No Toxicity Value
	120-12-7	Anthracene	0.42		0.42	J	mg/kg	SB-19	3/3		0.42	NA	1,700 (Noncancer)			N	BSL
	56-55-3	Benzo(a)anthracene	0.016	J	6.8	J	mg/kg	SB-19	3/3		6.8	NA	0.15 (Cancer)			Y	ASL
	50-32-8	Benzo(a)pyrene	0.4	ND	7.7		mg/kg	SB-19	3/3		7.7	NA	0.015 (Cancer)			Y	ASL
	205-99-2	Benzo(b)fluoroanthene	0.019	J	8.4		mg/kg	SB-19	3/3		8.4	NA	0.15 (Cancer)			Y	ASL
	191-24-2	Benzo(ghi)perylene	1.2	J	7.3	J	mg/kg	SB-19	3/3		7.3	NA	NA			N	No Toxicity Value
	207-08-9	Benzo(k)fluoroanthene	0.65	J	3.1	J	mg/kg	SB-19	3/3		3.1	NA	1.5 (cancer)			Y	ASL
	117-81-7	Bis(2-ethylhexyl)phthalate	0.043	J	7.4	ND	mg/kg	SB-19	2/3		7.4		35 (cancer)			N	BSL
	86-74-8	Carbazole	0.22	J	0.36	J	mg/kg	SB-19	3/3		0.36		NA			N	No Toxicity Value
	218-01-9	Chrysene	0.016	J	6.1	J	mg/kg	SB-19	3/3		6.1	NA	15 (Cancer)			N	BSL
	132-64-9	Dibenzofuran	0.033	J	0.033		mg/kg	SB-17	1/1		0.033	NA	7.8 (Noncancer			N	BSL
	53-70-3	Dibenzo(ah(anthracene	0.31	J	1.9	J	mg/kg	SB-19	3/3		1.9	NA	0.015 (Cancer)			Y	ASL
	206-44-0	Fluoroanthene	0.026	J	9.2		mg/kg	SB-19	3/3		9.2	NA	230 (Noncancer)			N	BSL
	86-73-7	Fluorene	0.17	J	0.3	J	mg/kg	SB-19	2/2		0.3		230 (Noncancer)			N	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.4	ND	6.1	J	mg/kg	SB-19	3/3		6.1	NA	0.15 (Cancer)			Y	ASL
	91-20-3	Napthalene	0.1	J	0.1		mg/kg	SB-17	1/1		0.1		3.6 (Cancer)			N	BSL
	85-01-8	Phenanthrene	2.3	J	3.2	J	mg/kg	SB-19	3/3		3.2	NA	NA			N	No Toxicity Value
	129-00-0	Pyrene	0.033	J	8.7		mg/kg	SB-19	3/3		8.7	NA	3.2 (Cancer)			Y	ASL
								Metals									
	7429-90-5	Aluminum	2010		4540		mg/kg	SB-19	3/3		4540	NA	7,700 (Noncancer)			N	BSL
	7440-36-0	Antimony (metallic)	0.51	ND	1.1	B	mg/kg	SB-20	2/3		1.1 B	NA	31 (Noncancer)			N	BSL
	7440-38-2	Arsenic (inorganic)	7.5		19.6		mg/kg	SB-19	9/9		66.5	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
	7440-39-3	Barium	62		93.8		mg/kg	SB-19	3/3		93.8	NA	15,000 (Noncancer)			N	BSL
	7440-41-7	Beryllium	0.29	B	0.64		mg/kg	SB-19	3/3		0.64	NA	16 (Noncancer)			N	BSL
	7440-43-9	Cadmium	0.05	ND	0.34	BN	mg/kg	SB-19	2/3		0.34 BN	NA	7 (Noncancer)			N	BSL
	18540-29-9	Chromium (VI)	5.8		39.1	SB	mg/kg	SB-19	9/9		39.1	NA	0.29 (Cancer)			Y	ASL
	7440-48-4	Cobalt	2.4	B	4.3	BE	mg/kg	SB-19	3/3		4.3 BE	NA	2.3 (Noncancer)			Y	ASL
	7440-50-8	Copper	24.8		244		mg/kg	SB-19	9/9		244	NA	310 (Noncancer)			N	BSL
	7439-89-6	Iron	15600	N	28000	N	mg/kg	SB-17	3/3		28000 N	NA	5,500 (Noncancer)			Y	ASL
	7439-92-1	Lead	10.7	N	149	N	mg/kg	SB-19	3/3		149 N	NA	400			Y	ASL
	7439-96-5	Manganese	18.6		154	N	mg/kg	SB-19	3/3		154 N	NA	180 (Noncancer)			N	ASL
	7439-97-6	Mercury	0.017	ND	0.143	N	mg/kg	SB-19	2/3		0.143 N	NA	1 (Noncancer)			N	BSL
	7440-02-0	Nickel (Soluble Salts)	0.054		14.2	E	mg/kg	SB-19	3/3		14.2 E	NA	150 (Noncancer)			N	BSL
	7782-49-2	Selenium	1.9	B	2.4	B	mg/kg	SB-17	3/3		2.4 B	NA	39 (Noncancer)			N	BSL
	7440-22-4	Silver	0.09	B	0.27	BN	mg/kg	SB-20	3/3		0.27 BN	NA	39 (Noncancer)			N	BSL
	7440-28-0	Thallium (Soluble Salts)	0.066	ND	0.75	B	mg/kg	SB-19	2/3		0.75 B	NA	0.078 (Noncancer)			Y	ASL
	7440-62-2	Vanadium and Compounds	12	E	14.6	E	mg/kg	SB-19	3/3		14.6 E	NA	39 (Noncancer)			N	ASL
	7440-66-6	Zinc	19.6	N	1660	N	mg/kg	SB-19	9/9		1660	NA	2,300 (Noncancer)			N	BSL

(1) Maximum Concentration of all samples used as screening level.

(2) Screening Toxicity Concentration is based on lowest concentration in soil based on a comparison of the concentrations associated with residential exposures at a cancer risk of 10-6 or a noncancer HI = 0.1. The screening levels were obtained from the May 2013 Regional Screening Level Tables available at: http://www.epa.gov/region9/superfund/prg/.

Definitions

ARAR - Applicable or Relevant and Appropriate Requirements

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COPC - Chemical of Potential Concern

ASL - Above Screening Levels

BSL - Below Screening Levels

(J) Compound reported at an estimated concentration below the sample quantitation limit.

(E) Estimated concentration due to the presence of intereference (inorganics)

(N) Spike sample recovery or spike analysis is not within quality control limits (inorganics).

Table 2.3. Summary of Site Data and Sample Locations (Property H).

Chemical	SS-5	SS-8+	SS-8+	SS-9	SS-10	SS-13	SS-14	SS-25	SS-27	SS-30	SB-17	SB-19	SB-20	Location of Max	Minimum		Maximum		# Samples
PCBs			6.3	8.0	0.460 J			0.097 ND	0.120 ND	0.18		0.090 ND	0.099 ND	SS-9	0.09	ND	8		4/8
Arsenic								12.3 N	66.5 N	13.4 N	9.5	19.6	15.8 E	SB-19	7.5		66.5	N	6/6
Chromium								39.1 EN	15.7 EN	25.6 EN	5.8	9.1	5.1	SB-17	5.8		39.1	EN	6/6
Copper								66.5 EN	54.6 EN	244 EN	24.8	44.2	24.9 E	SS-30	25		244	EN	6/6
Lead	29.8 E	1100 E	1360 E	4630 E		140 E	172 E	349 E	214 E	1160 E	10.7 N	149 N	70.2 E	SS-30	10.7	N	1360	EN	12/12
Zinc								255 E	231 E	1660 E	19.6 N	106 N	71.2 E	SS-30	106	N	1660	E	6/6
Aluminum											2010	4540	2410 E	SB-19	2010		4540		3/3
Antimony (metallic)											0.57 (ND)	0.51 ND	1.1 B	SB-20	0.51	ND	1.1	B	2/3
Arsenic (inorganic)											9.5	19.6	15.8 E	SB-19	9.5		19.6		3/3
Barium											66.1	93.8	62	SB-19	62		93.8		3/3
Beryllium											0.29 B	0.64	0.42 B	SB-19	0.29	B	0.64		3/3
Cadmium											0.05 ND	0.34 BN	0.34 B	SB-19	0.05		0.34	BN	2/3
Chromium (VI)														See above					3/3
Cobalt											2.8 BE	4.3 BE	2.4 B	SB-19	2.4	B	4.3	BE	3/3
Copper														See Above					3/3
Iron											28000 N	15600 N	11400 E	SB-17	11400	E	28000	N	3/3
Lead														See Above					
Manganese											18.6 N	154 N	100 E	SB-19	18.6		154	N	3/3
Mercury											0.017 ND	0.143 N	0.054	SB-19	0.017	ND	0.143	N	2/3
Nickel (Soluble Salts)											6.4 E	14.2 E	9.1	SB-19	6.4	E	14.2	E	3/3
Selenium											2.4 B	1.9 B	0.97 B	SB-17	0.97	B	2.4	B	3/3
Silver											0.21 BN	0.27 BN	0.09 B	SB-20	0.21	BN	0.27	BN	3/3
Thallium (Soluble Salts)											0.72 B	0.75 B	0.66 ND	SB-19	0.66	ND	0.75	B	2/3
Vanadium and Compounds											12.4 E	14.6 E	12	SB-19	12		14.6	E	3/3
Zinc														See above					3/3

Table 2.4. Summary of Site Data and Sample Locations (Property H).

Chemical	SS-5	SS-8+	SS-8+	SS-9	SS-10	SS-13	SS-14	SS-25	SS-27	SS-30	SB-17	SB-19	SB-20	Location of Max	Minimum		Maximum		# Samples
2-methylnapthalene											0.130 J			SB-17			0.13		1/1
Acenaphthylene												2.800 J	0.340 J	SB-19	0.34	J	2.8	J	2/2
Anthracene												1.4 J	0.420 J	SB-19	0.42		0.42	J	2/2
Benzo(a)anthracene											0.016 J	6.800 J	1.700 J	SB-19	0.016	J	6.8	J	3/3
Benzo(a)pyrene											0.400 (ND)	7.7	1.500 J	SB-19	0.4	ND	7.7		3/3
Benzo(b)fluoroanthene											0.019 J	8.4	1.900 J	SB-19	0.019	J	8.4		3/3
Benzo(ghi)perylene											0.400 (ND)	7.300 J	1.200 J	SB-19	0.4	ND	7.3	J	3/3
Benzo(k)fluoroanthene												3.100 J	0.650 J	SB-19	0.65	J	3.1	J	2/2
Bis-2-ethylhexyl phthalate											0.043 J	7.400 ND	0.249 BJ	SB-19	0.043	J	7.4	ND	3/3
Carbazole												0.360 J	0.220 J	SB-19	0.22	J	0.36	J	2/2
Chrysene											0.016 J	6.100 J	1.500 J	SB-19	0.016	J	6.1	J	3/3
Dibenzofuran											0.033 J			SB-17	0.033	J	0.033		1/1
Dibenzo(ah(anthracene												1.900 J	0.310 J	SB-19	0.31	J	1.9	J	2/2
Fluoroanthene											0.026 J	9.2	4.000 J	SB-19	0.026	J	9.2		3/3
Fluorene												0.310 J	0.170 J	SB-19	0.17	J	0.3	J	2/2
Indeno(1,2,3-cd)pyrene											0.4 (ND	6.1 J	1.000 J	SB-19	0.4	ND	6.1	J	3/3
Napthalene											0.1 J			SB-17	0.1	J	0.1		1/1
Phenanthrene											0.083 J	3.200 J	2.300 J	SB-19	0.083	J	3.2	J	3/3
Pyrene											0.033 J	8.7	3.100 J	SB-19	0.033	J	8.7		3/3

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Table 2.5. Summary of Site Data a (Property H).

	PCBs	Arsenic	Chrome	Cobalt	Iron	Lead
SS-5						29.8
SS-8+	6.3					1100
SS-9	8					1360
SS-10	0.46					4630
SS-13						140
SS-14						172
SS-25	0.0485	12.3	39.1			349
SS-27	0.06	66.5	15.7			214
SS-30	0.18	13.47	25.6			1160
SB-17		9.5	5.8	2.8	28000	10.7
SB-19		19.6	9.1	4.3	15600	149
SB-20		15.8	5.1	2.4	11400	70.2

TABLE 3.1.RME (Property H)
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Surface Soil (0 to 1.6 Feet)
Exposure Medium: Surface Soil (0 to 1.6 Feet)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Surface Soil (0 to 1.6 Feet)	Total PCBs	mg/kg	0.244	Data not normal or log normal at the 5% Significance	8.0	8.0	mg/kg	Maximum (calculated value exceeds the maximum concentration)	ProUCL 4.1
	Benzo(a)anthracene	mg/kg	6.8		6.8	6.8	mg/kg	Maximum (Less than 4 Distinct Samples)	ProUCL 4.1
	Benzo(a)pyrene	mg/kg	7.7		7.7	7.7	mg/kg	Maximum (Less than 4 Distinct Samples)	ProUCL 4.1
	Benzo(b)fluoroanthene	mg/kg	8.4		8.4	8.4	mg/kg	Maximum (Less than 4 Distinct Samples)	ProUCL 4.1
	Benzo(k)fluoroanthene	mg/kg	3.1		3.1	3.1	mg/kg	Maximum (Less than 4 Distinct Samples)	ProUCL 4.1
	Dibenzo(ah)anthracene	mg/kg	1.9		1.9	1.9	mg/kg	Maximum (Less than 4 Distinct Samples)	ProUCL 4.1
	Indeno(1,2,3-cd)pyrene	mg/kg	6.1		6.1	6.1	mg/kg	Maximum (Less than 4 Distinct Samples)	ProUCL 4.1
	Pyrene	mg/kg	8.7		8.7	8.7	mg/kg	Maximum (Less than 4 Distinct Samples)	ProUCL 4.1
	Arsenic (inorganic)	mg/kg				48.1	mg/kg	95% Approximate Gamma UCL	ProUCL 4.1
	Chromium (VI)	mg/kg				27.7	mg/kg	95% Student's t-UCL	ProUCL 4.1
	Cobalt	mg/kg				4.3	mg/kg	Maximum (Less than 4 Distinct Samples)	ProUCL 4.1
	Iron	mg/kg				28000	mg/kg	Maximum (Less than 4 Distinct Samples)	ProUCL 4.1
	Lead	mg/kg				782.1	mg/kg	Mean Value	ProUCL 4.1

(1) Utilized ProUCL Version 4.1

Definitions
ARAR - Applicable or Relevant and Appropriate Requirements
TBC - To Be Considered Values
COPC - Chemical of Potential Concern
ASL - Above Screening Levels
BSL - Below Screening Levels
(J) Compound reported at an estimated concentration below the sample quantization limit.
(E) Estimated concentration due to the presence of interference (inorganic)
(N) Spike sample recovery or spike analysis is not within quality control limits (inorganic).

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Table 3.2. ProUCL Output for PCBs.

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet_a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

PCBs

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	0.0485	Minimum of Log Data	-3.026
Maximum	8	Maximum of Log Data	2.079
Mean	2.508	Mean of log Data	-0.735
Median	0.32	SD of log Data	2.24
SD	3.639		
Coefficient of Variation	1.451		
Skewness	1.055		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.717	Shapiro Wilk Test Statistic	0.87
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5.501	95% H-UCL	31946
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	11.31
95% Adjusted-CLT UCL (Chen-1995)	5.635	97.5% Chebyshev (MVUE) UCL	15.08
95% Modified-t UCL (Johnson-1978)	5.608	99% Chebyshev (MVUE) UCL	22.49
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.31	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	8.088		
MLE of Mean	2.508		
MLE of Standard Deviation	4.504		
nu star	3.721		
Approximate Chi Square Value (.05)	0.615	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	4.951
Adjusted Chi Square Value	0.291	95% Jackknife UCL	5.501
		95% Standard Bootstrap UCL	4.766
Anderson-Darling Test Statistic	0.582	95% Bootstrap-t UCL	54.83
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	58.98
Kolmogorov-Smirnov Test Statistic	0.277	95% Percentile Bootstrap UCL	5.068
Kolmogorov-Smirnov 5% Critical Value	0.353	95% BCA Bootstrap UCL	5.157
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	8.983
		97.5% Chebyshev(Mean, Sd) UCL	11.78
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	17.29
95% Approximate Gamma UCL	15.18		
95% Adjusted Gamma UCL	32.05		
Potential UCL to Use		Use 95% Adjusted Gamma UCL	32.05
Recommended UCL exceeds the maximum observation			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3.3. ProUCL Output for Arsenic

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet_a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	9.5	Minimum of Log Data	2.251
Maximum	66.5	Maximum of Log Data	4.197
Mean	22.86	Mean of log Data	2.882
Median	14.64	SD of log Data	0.688
SD	21.65		
Coefficient of Variation	0.947		
Skewness	2.316		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.646	Shapiro Wilk Test Statistic	0.823
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	40.67	95% H-UCL	59.46
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	48.03
95% Adjusted-CLT UCL (Chen-1995)	46.33	97.5% Chebyshev (MVUE) UCL	59.45
95% Modified-t UCL (Johnson-1978)	42.06	99% Chebyshev (MVUE) UCL	81.87
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.199	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	19.07		
MLE of Mean	22.86		
MLE of Standard Deviation	20.88		
nu star	14.39		
Approximate Chi Square Value (.05)	6.836	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	37.4
Adjusted Chi Square Value	5.076	95% Jackknife UCL	40.67
		95% Standard Bootstrap UCL	35.9
Anderson-Darling Test Statistic	0.79	95% Bootstrap-t UCL	114.6
Anderson-Darling 5% Critical Value	0.704	95% Hall's Bootstrap UCL	110.1
Kolmogorov-Smirnov Test Statistic	0.33	95% Percentile Bootstrap UCL	39.13
Kolmogorov-Smirnov 5% Critical Value	0.336	95% BCA Bootstrap UCL	41.4
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	61.38
		97.5% Chebyshev(Mean, Sd) UCL	78.05
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	110.8
95% Approximate Gamma UCL	48.11		
95% Adjusted Gamma UCL	64.8		
Potential UCL to Use		Use 95% Approximate Gamma UCL	48.11

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3.4. ProUCL Ouptut Cobalt.

General UCL Statistics for Full Data Sets

User Selected Options			
From File	WorkSheet_a.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Cobalt

General Statistics			
Number of Valid Observations	3	Number of Distinct Observations	3
Number of Missing Values	1		

Warning: This data set only has 3 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C3 was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Table 3.5. ProUCL Output for Chromium

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet_a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Chromium

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	5.1	Minimum of Log Data	1.629
Maximum	39.1	Maximum of Log Data	3.666
Mean	16.73	Mean of log Data	2.543
Median	12.4	SD of log Data	0.82
SD	13.36		
Coefficient of Variation	0.799		
Skewness	1.076		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.878	Shapiro Wilk Test Statistic	0.937
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	27.73	95% H-UCL	65.01
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	40.73
95% Adjusted-CLT UCL (Chen-1995)	28.27	97.5% Chebyshev (MVUE) UCL	51.15
95% Modified-t UCL (Johnson-1978)	28.13	99% Chebyshev (MVUE) UCL	71.62
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.097	Data appear Normal at 5% Significance Level	
Theta Star	15.25		
MLE of Mean	16.73		
MLE of Standard Deviation	15.97		
nu star	13.17		
Approximate Chi Square Value (.05)	6.005	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	25.71
Adjusted Chi Square Value	4.379	95% Jackknife UCL	27.73
		95% Standard Bootstrap UCL	24.93
Anderson-Darling Test Statistic	0.292	95% Bootstrap-t UCL	36.56
Anderson-Darling 5% Critical Value	0.704	95% Hall's Bootstrap UCL	41.87
Kolmogorov-Smirnov Test Statistic	0.201	95% Percentile Bootstrap UCL	26.18
Kolmogorov-Smirnov 5% Critical Value	0.336	95% BCA Bootstrap UCL	25.75
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	40.52
		97.5% Chebyshev(Mean, Sd) UCL	50.81
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	71.02
95% Approximate Gamma UCL	36.69		
95% Adjusted Gamma UCL	50.31		
Potential UCL to Use		Use 95% Student's-t UCL	27.73

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table 3.7. ProUCL Ouput for Lead.

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet_a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Iron

General Statistics			
Number of Valid Observations	3	Number of Distinct Observations	3
Number of Missing Values	1		

Warning: This data set only has 3 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C4 was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Table 3.7. ProUCL Output for Lead.

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet_a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead

General Statistics			
Number of Valid Observations	12	Number of Distinct Observations	12
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	10.7	Minimum of Log Data	2.37
Maximum	4630	Maximum of Log Data	8.44
Mean	782.1	Mean of log Data	5.504
Median	193	SD of log Data	1.729
SD	1305		
Coefficient of Variation	1.669		
Skewness	2.697		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.616	Shapiro Wilk Test Statistic	0.976
Shapiro Wilk Critical Value	0.859	Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1459	95% H-UCL	10722
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2906
95% Adjusted-CLT UCL (Chen-1995)	1715	97.5% Chebyshev (MVUE) UCL	3792
95% Modified-t UCL (Johnson-1978)	1508	99% Chebyshev (MVUE) UCL	5532
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.462	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1693		
MLE of Mean	782.1		
MLE of Standard Deviation	1151		
nu star	11.08		
Approximate Chi Square Value (.05)	4.63	Nonparametric Statistics	
Adjusted Level of Significance	0.029	95% CLT UCL	1402
Adjusted Chi Square Value	4.013	95% Jackknife UCL	1459
		95% Standard Bootstrap UCL	1371
Anderson-Darling Test Statistic	0.442	95% Bootstrap-t UCL	2354
Anderson-Darling 5% Critical Value	0.782	95% Hall's Bootstrap UCL	3445
Kolmogorov-Smirnov Test Statistic	0.203	95% Percentile Bootstrap UCL	1447
Kolmogorov-Smirnov 5% Critical Value	0.258	95% BCA Bootstrap UCL	1749
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2425
		97.5% Chebyshev(Mean, Sd) UCL	3136
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4532
95% Approximate Gamma UCL	1872		
95% Adjusted Gamma UCL	2160		
Potential UCL to Use		Use 95% Approximate Gamma UCL	1872

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

USEPA (1991). Risk assessment guidance for Superfund. Volume I. Human health evaluation manual - Supplemental Guidance: Standard default exposure factors." Office of Emergency and Remedial Response (Washington, D.C.) OSWER Directive 9285.6-03. NTIS PB91-921314, 10 p, March 25, 1991.

USEPA (2004). Risk assessment guidance for Superfund (RAGS). Vol 1: human health evaluation manual (part E, supplemental guidance for dermal risk assessment). Final. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. EPA/540/R/99/005.

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TABLE 4.1.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	6	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	6	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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USEPA (1991). Risk assessment guidance for Superfund. Volume I. Human health evaluation manual - Supplemental Guidance: Standard default exposure factors." Office of Emergency and Remedial Response (Washington, D.C.) OSWER Directive 9285.6-03. NTIS PB91-921314, 10 p, March 25, 1991.

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TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - FOR CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.2.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (2 years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (4 years)	1460	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.97	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.3.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	10	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	3650	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 Years)	10	years	EPA1991 and 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION CHEMICALS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.4.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA1991	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.5 .RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 1991	

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TABLE 4.6. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1999	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resdent	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.6.CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (3 years)	1095	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

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TABLE 4.7 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	year	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	year	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.7.CTE MMOA (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE -CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (3 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 2002	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - C *CF
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 2002	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.8 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	Mean of IR	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Speicfic	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	yrs	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.8 CTE MMOA for Child (6 to < 16 Years) (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHILD (6 TO < 16 YEARS) MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (1 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.9. CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemcial Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

'(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.9 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor (1)	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.10 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor-1016	Chronic	7E-05	mg/kg-day	1E+00	7E-05	mg/kg-day	Reduced birth weight)	100	IRIS	03/11/13
Aroclor-1254	Chronic	2E-05	mg/kg-day	1E+00	2E-05	mg/kg-day	immune system	300	IRIS	03/11/13
Benzo(a)anthracene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Benzo(a)pyrene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Benzo(b)fluoroanthene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Benzo(k)fluoroanthene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Dibenzo(ah)anthracene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Indeno(1,2,3-cd)pyrene	Chronic	N/A	mg/kg-day	1E+00	N/A	mg/kg-day	N/A		IRIS	03/11/13
Pyrene	Chronic	3E-02	mg/kg-day	1E+00	N/A	mg/kg-day	Kidney Effects		IRIS	03/11/13
Aluminum	Chronic	1E+00	mg/kg-day	1E+00	N/A	mg/kg-day	LOAEL for minimal	100	PPRTV	03/11/13
Arsenic (inorganic)	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Hyperpigmentation, keratosis and possible vascular complications	3	IRIS	03/11/13
Chromium (VI)	Chronic	3E-03	mg/kg-day	1E+00	3E-03	mg/kg-day	NOAEL adjusted	300	IRIS	03/11/13
Cobalt	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	LOAEL-decreased iodine	3,000	PPRTV	03/11/13
Copper	Chronic	4E-02	mg/kg-day	1E+00	4E-02	mg/kg-day	Irritation	(Not Stated)	HEAST	07/01/97
Iron	Chronic	7E-01	mg/kg-day	1E+00	7E-01	mg/kg-day	LOAEL of 1 mg/kg-day for total daily iron intake for adverse gastrointestinal effects	1.5	PPRTV	05/31/13
Manganese	Chronic	1E-01	mg/kg-day	1E+00	1E-01	mg/kg-day	CNS Effects	1	IRIS	03/11/13

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

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TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor 1254	Chronic	7E-08	mg/m3			immune system	100	Route to Route Extrapolation	9/20/2009
Aroclor 1016	Chronic	2E-07	mg/m3			reduced birthweight	300	Route to Route Extrapolation	9/20/2009
Benzo(a)anthracene		NA				NA			
Benzo(a)pyrene		NA				NA			
Benzo(b)fluoroanthene		NA				NA			
Benzo(k)fluoroanthene		NA				NA			
Dibenzo(ah)anthracene		NA				NA			
Indeno(1,2,3-cd)pyrene		NA				NA			
Pyene		NA				NA			
Aluminum	Chronic	5 E-03	mg/m3			LOAEL	300	PPRTV	03/11/13
Arsenic (inorganic)	Chronic	1.5E-05	mg/m3			Development; cardiovascular system; nervous system; lung; skin Development; cardiovascular system; nervous system; lung; skin	Not Listed	CalEPA	03/11/13
Chromium (VI)	Chronic	1E-04	mg/m3			Lactate dehydrogenase in bronchioalveolar lavage fluid	300	IRIS	03/11/13
Cobalt	Chronic	6E-06	mg/m3					PPRTV	03/11/13
Copper	Chronic	NA	mg/m3			NA	NA	IRIS	03/11/13
Iron		NA							
Manganese	Chronic	5E-05	mg/m3			Impairment of neurobehavioral function (other effect: Impairment of neurobehavioral function.	1,000	IRIS	03/11/13

R2-0014751

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units	(1)	Value (2)	Units	-3	Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(a)anthracene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(a)pyrene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(b)fluoroanthene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Benzo(k)fluoroanthene	7.3E-02	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Dibenzo(ah)anthracene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Indeno(1,2,3-cd)pyrene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Pyrene	NA					NA		
Aluminum	NA					inadequate information to assess carcinogenic potential	PPRTV	3/13/2013
Arsenic (inorganic)	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/13/2013
Chromium (VI)	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1E+00	5.0E-01	$(mg/kg\text{-}day)^{-1}$	A	NJDEP/CalEPA	03/13/2013
Cobalt	NA							
Copper	NA					D	IRIS	3/13/2013
Iron	NA							
Manganese	NA							
Thallium (Soluble Salts)	NA							

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

(2) Based on oral cancer slope factor for Dermal exposure, if an absorption factor has been applied

(3) Weight of Evidence Determinations

A - Known human carcinogen

B2 - Probable Human Carcinogen with adequate animal evidence and inadequate or supportive human evidence

D - Not classifiable as to carcinogenicity.

Definitions:

IRIS - Integrated Risk Information System

NJDEP - New Jersey Department of Environmental Protection

CalEPA - California Environmental Protection Agency

PPRTV - Provisional Peer-Reviewed Toxicity Values.

mg/kg-day - milligram/kilogram-day

NA - not available

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline	Unit Risk : Inhalation CSF	
	Value	Units	Value (1)	Units	(3)	Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	5.7E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
PCBs (Total)	1.0E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(a)anthracene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(a)pyrene	1.1#-03	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(b)fluoroanthene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Benzo(k)fluoroanthene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Dibenzo(ah)anthracene	1.2E-03	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Indeno(1,2,3-cd)pyrene	1.1E-04	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Pyrene	NA	$(ug/m3)^{-1}$			B2	IRIS	04/21/09
Aluminum	NA				inadequate information to assess carcinogenic potential	PPRTV	03/13/2013
Arsenic (inorganic)	4.3E-03	$(ug/m3)^{-1}$			A	IIRS	03/13/2013
Chromium (VI)	8.4E-02	$(ug/m3)^{-1}$			A	NJDEP/CalEPA	03/13/2013
Copper	NA				D	IRIS	3/13/2013
Cobalt	9.0E-03	$(ug/m3)^{-1}$				PPRTV	04/21/09
Iron	NA						
Lead	NA						
Manganese	NA						
Thallium (Soluble Salts)	NA						

(1) Based on IRIS file inhalation cancer slope factor for dust or aerosol inhalation

(2) Based on IRIS recommendation when addressing Inhalation of evaporated congeners

(3) Weight of Evidence Determinations

A - Known human carcinogen

B2 - Probable Human Carcinogen with adequate animal evidence and inadequate or supportive human evidence

D - Not classifiable as to carcinogenicity.

Definitions:

IRIS - Integrated Risk Information System

NJDEP - New Jersey Department of Environmental Protection

CalEPA - California Environmental Protection Agency

PPRTV - Provisional Peer-Reviewed Toxicity Values.

mg/kg-day - milligram/kilogram-day

NA - not available

TABLE 7.1. RME (Property H) (Page 1)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence (Property H)	Ingestion	Benzo(a)anthracene (< 2 yrs)	6.8	mg/kg	2.5E-06	mg/kg day	7.3	(mg/kg-day)-	1.8E-05			NA		
				Benzo(a)anthracene (2 to 6 yrs)	6.8	mg/kg	5.0E-06	mg/kg day	2.2	(mg/kg-day)-	1.1E-05			NA		
				Benzo(a)anthracene (6 to <16 yrs)	6.8	mg/kg	1.3E-06	mg/kg day	2.2	(mg/kg-day)-	2.9E-06			NA		
				Benzo(a)pyrene (< 2 yrs)	7.7	mg/kg	2.8E-06	mg/kg day	73	(mg/kg-day)-	2.1E-04			NA		
				Benzo(a)pyrene (2 to 6 yrs)	7.7	mg/kg	5.6E-06	mg/kg day	21.9	(mg/kg-day)-	1.2E-04			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	7.7	mg/kg	1.5E-06	mg/kg day	21.9	(mg/kg-day)-	3.3E-05			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	8.4	mg/kg	3.1E-06	mg/kg day	7.3	(mg/kg-day)-	2.2E-05			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	8.4	mg/kg	6.1E-06	mg/kg day	2.19	(mg/kg-day)-	1.3E-05			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	8.4	mg/kg	1.6E-06	mg/kg day	2.19	(mg/kg-day)-	3.6E-06			NA		
				Benzo(k)fluoroanthene (< 2 yrs)	3.1	mg/kg	1.1E-06	mg/kg day	0.73	(mg/kg-day)-	8.3E-07			NA		
				Benzo(k)fluoroanthene (2 to 6 yrs)	3.1	mg/kg	2.3E-06	mg/kg day	0.219	(mg/kg-day)-	5.0E-07			NA		
				Benzo(k)fluoroanthene (6 to < 16 yrs)	3.1	mg/kg	6.1E-07	mg/kg day	0.219	(mg/kg-day)-	1.3E-07			NA		
				Dibenzo(ah)anthracene (< 2 yrs)	1.9	mg/kg	6.9E-07	mg/kg day	73	(mg/kg-day)-	5.1E-05			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	1.9	mg/kg	1.4E-06	mg/kg day	21.9	(mg/kg-day)-	3.0E-05			NA		
				Dibenzo(ah)anthracene (6 to <16 yrs)	1.9	mg/kg	3.7E-07	mg/kg day	21.9	(mg/kg-day)-	8.1E-06			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	6.1	mg/kg	2.2E-06	mg/kg day	7.3	(mg/kg-day)-	1.6E-05			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	6.1	mg/kg	4.5E-06	mg/kg day	2.2	(mg/kg-day)-	9.8E-06			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	6.1	mg/kg	1.2E-06	mg/kg day	2.2	(mg/kg-day)-	2.6E-06			NA		
				Pyrene (< 2 yrs)	8.7	mg/kg			NA			0.0001	mg/kg day	0.03	mg/kg day	0.004
				Pyrene (2 to 6 yrs)	8.7	mg/kg			NA			0.0001	mg/kg day	0.03	mg/kg day	0.004
				Pyrene (6 to < 16 Yrs.)	8.7	mg/kg			NA			0.00001	mg/kg day	0.03	mg/kg day	0.0004
				Arsenic (inorganic)	48.1	mg/kg	3.2E-05	mg/kg day	1.5	(mg/kg-day)-	4.7E-05	0.0004	mg/kg day	0.0003	mg/kg day	1.2
				Chromium (VI) (< 2)	27.7	mg/kg	1.0E-05	mg/kg day	5.0	(mg/kg-day)-	5.1E-05	0.0004	mg/kg day	0.003	mg/kg day	0.1
				Chromium (VI) (2 to 6)	27.7	mg/kg	2.0E-05	mg/kg day	1.5	(mg/kg-day)-	3.0E-05	0.0004	mg/kg day	0.003	mg/kg day	0.1
				Chromium (VI) (6 to < 16)	27.7	mg/kg	5.4E-06	mg/kg day	1.5	(mg/kg-day)-	8.1E-06	0.0001	mg/kg day	0.003	mg/kg day	0.03
				Cobalt	4.3	mg/kg	2.4E-06	mg/kg day	NA			0.0001	mg/kg day	0.0003	mg/kg day	0.2
				Iron	28000	mg/kg	3.1E-02	mg/kg day	NA			0.4	mg/kg day	0.7	mg/kg day	0.5
				PCBs	8.0	mg/kg	8.8E-06	mg/kg day	2.0	(mg/kg-day)-	1.8E-05	0.0001	mg/kg day	0.00002	mg/kg day	5.11
			Exp. Route Total								7.1E-04					7.3

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TABLE 7.1. RME (Property H) (Page 2)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Surface Soil	Residence (Property H)	Dermal	Benzo(a)anthracene (< 2 yrs)	6.8	mg/kg	9.0E-07	mg/kg day	7.3	(mg/kg-day)-	6.6E-06			NA		
				Benzo(a)anthracene (2 to 6 yrs)	6.8	mg/kg	1.8E-06	mg/kg day	2.2	(mg/kg-day)-	4.0E-06			NA		
				Benzo(a)anthracene (6 to <16 yrs)	6.8	mg/kg	6.9E-07	mg/kg day	2.2	(mg/kg-day)-	1.5E-06			NA		
				Benzo(a)pyrene (< 2 yrs)	7.7	mg/kg	1.0E-06	mg/kg day	73	(mg/kg-day)-	7.5E-05			NA		
				Benzo(a)pyrene (2 to 6 yrs)	7.7	mg/kg	2.0E-06	mg/kg day	21.9	(mg/kg-day)-	4.5E-05			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	7.7	mg/kg	7.8E-07	mg/kg day	21.9	(mg/kg-day)-	1.7E-05			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	8.4	mg/kg	1.1E-06	mg/kg day	7.3	(mg/kg-day)-	8.2E-06			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	8.4	mg/kg	2.2E-06	mg/kg day	2.2	(mg/kg-day)-	4.9E-06			NA		
				Benzo(b)fluoroanthene (6 to <16 yrs)	8.4	mg/kg	8.5E-07	mg/kg day	2.2	(mg/kg-day)-	1.9E-06			NA		
				Benzo(k)fluoroanthene (< 2 yrs)	3.1	mg/kg	4.1E-07	mg/kg day	0.73	(mg/kg-day)-	3.0E-07					
				Benzo(k)fluoroanthene (2 to 6 yrs)	3.1	mg/kg	8.2E-07	mg/kg day	0.2	(mg/kg-day)-	1.8E-07					
				Benzo(k)fluoroanthene (6 to <16 yrs)	3.1	mg/kg	3.1E-07	mg/kg day	0.219	(mg/kg-day)-	6.9E-08					
				Dibenzo(ah)anthracene (< 2 yrs)	1.9	mg/kg	2.5E-07	mg/kg day	0.219	(mg/kg-day)-	5.5E-08			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	1.9	mg/kg	5.1E-07	mg/kg day	21.9	(mg/kg-day)-	1.1E-05			NA		
				Dibenzo(ah)anthracene (6 to < 16 yrs)	1.9	mg/kg	1.9E-07	mg/kg day	21.9	(mg/kg-day)-	4.2E-06			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	6.1	mg/kg	8.1E-07	mg/kg day	7.3	(mg/kg-day)-	5.9E-06			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	6.1	mg/kg	1.6E-06	mg/kg day	21.9	(mg/kg-day)-	3.6E-05			NA		
				Indeno(1,2,3-cd)pyrene (6 to <16 yrs)	6.1	mg/kg	6.2E-07	mg/kg day	21.9	(mg/kg-day)-	1.4E-05			NA		
				Pyrene (< 2 yrs)	8.7	mg/kg	NA					0.000009	mg/kg day	0.03	mg/kg day	0.0003
				Pyrene (2 to 6 yrs)	8.7	mg/kg	NA					0.000009	mg/kg day	0.03	mg/kg day	0.0003
				Pyrene (6 to < 16 Yrs.)	8.7	mg/kg	NA					0.000001	mg/kg day	0.03	mg/kg day	0.0000
				Arsenic (inorganic)	48.1	mg/kg	4.4E-06	mg/kg day	1.5	(mg/kg-day)-	6.6E-06	0.00005	mg/kg day	0.0003	mg/kg day	0.17
				PCBs	8.0	mg/kg	3.4E-06	mg/kg day	2.000	(mg/kg-day)-	6.9E-06	0.00004	mg/kg day	0.00002	mg/kg day	2.00
			Exp. Route Total								1.4E-05					0.2

TABLE 7.1. RME (Property H) (Page 3)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Surface Soil	Surface Soil	Residence Property H	Inhalation (Fugitive Dust)	Benzo(a)anthracene (< 2 yrs)	6.8	mg/kg	1.3E-07	ug/m3	0.001	(ug/m3)$^{-1}$	1.5E-10			NA		
				Benzo(a)anthracene (> 2 to 6 yrs)	6.8	mg/kg	2.7E-07	ug/m3	0.0003	(ug/m3)$^{-1}$	8.8E-11			NA		
				Benzo(a)anthracene (6 to < 16 yrs)	6.8	mg/kg	6.7E-07	ug/m3	0.0003	(ug/m3)$^{-1}$	2.2E-10			NA		
				Benzo(a)pyrene (< 2 yrs)	7.7	mg/kg	1.5E-07	ug/m3	0.01	(ug/m3)$^{-1}$	1.7E-09			NA		
				Benzo(a)pyrene (2 to 6 yrs)	7.7	mg/kg	3.0E-07	ug/m3	0.003	(ug/m3)$^{-1}$	9.9E-10			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	7.7	mg/kg	7.5E-07	ug/m3	0.003	(ug/m3)$^{-1}$	2.5E-09			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	8.4	mg/kg	1.6E-07	ug/m3	0.001	(ug/m3)$^{-1}$	1.8E-10			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	8.4	mg/kg	3.3E-07	ug/m3	0.0003	(ug/m3)$^{-1}$	1.1E-10			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	8.4	mg/kg	8.2E-07	ug/m3	0.0003	(ug/m3)$^{-1}$	2.7E-10			NA		
				Benzo(k)fluoroanthene (< 2 yrs)	3.1	mg/kg	6.1E-08	ug/m3	0.0011	(ug/m3)$^{-1}$	6.7E-11					
				Benzo(k)fluoroanthene (2 to 6 yrs)	3.1	mg/kg	1.2E-07	ug/m3	0.0003	(ug/m3)$^{-1}$	4.0E-11					
				Benzo(k)fluoroanthene (6 to < 16 yrs)	3.1	mg/kg	3.0E-07	ug/m3	0.0003	(ug/m3)$^{-1}$	1.0E-10			NA		
				Dibenzo(ah)anthracene (< 2 yrs)	1.9	mg/kg	3.7E-08	ug/m3	0.012	(ug/m3)$^{-1}$	4.5E-10			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	1.9	mg/kg	7.4E-08	ug/m3	0.004	(ug/m3)$^{-1}$	2.7E-10			NA		
				Dibenzo(ah)anthracene (6 to < 16 yrs)	1.9	mg/kg	1.9E-07	ug/m3	0.004	(ug/m3)$^{-1}$	6.7E-10			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	6.1	mg/kg	1.2E-07	ug/m3	0.0011	(ug/m3)$^{-1}$	1.3E-10			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	6.1	mg/kg	2.4E-07	ug/m3	0.0003	(ug/m3)$^{-1}$	7.9E-11			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	6.1	mg/kg	6.0E-07	ug/m3	0.0003	(ug/m3)$^{-1}$	2.0E-10			NA		
				Arsenic (inorganic)	48.11	mg/kg	2.8E-06	ug/m3	0.004	(ug/m3)$^{-1}$	1.2E-08	3.3E-08	mg/m3	0.000015	mg/m3	0.002
				Chromium (VI) (< 2 years)	27.7	mg/kg	1.1E-06	ug/m3	0.8	(ug/m3)$^{-1}$	9.1E-07	1.9E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 years)	27.7	mg/kg	2.7E-06	ug/m3	0.3	(ug/m3)$^{-1}$	6.8E-07	1.9E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to <16 years)	27.7	mg/kg	1.6E-06	ug/m3	0.3	(ug/m3)$^{-1}$	4.1E-07	1.9E-08	mg/m3	0.0001	mg/m3	0.0002
				Cobalt	4.3	mg/kg	2.5E-07	ug/m3	0.009	(ug/m3)$^{-1}$	2.3E-09	2.9E-09	mg/m3	0.000006	mg/m3	0.0005
				Iron	28000	mg/kg	1.6E-03	ug/m3	NA	(ug/m3)$^{-1}$		1.9E-05	mg/m3	NA	mg/m3	NA
				PCBs	8.0	mg/kg	4.7E-07	ug/m3	1.0E-03	(ug/m3)$^{-1}$	4.7E-10	5.5E-09	mg/m3	0.00000007	mg/m3	0.08
			Exp. Route Total								2.0E-06					0.08
		Exposure Point Total									7.2E-04					7.48
Exposure Medium Total											7.2E-04					7.5
ırface Soil Total											7.2E-04					7.5
							Total of Receptor Risks Across All Media				**7.2E-04**	**Total of Receptor Hazards Across All Media**				**7.5**

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TABLE 7.2. RME (Property H)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				Hazard Quotient
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence Property H	Ingestion	Benzo(a)anthracene	6.8	mg/kg	1.9E-06	mg/kg day	0.73	(mg/kg-day)$^{-1}$	1.4E-06			NA		
				Benzo(a)pyrene	7.7	mg/kg	2.1E-06	mg/kg day	7.3	(mg/kg-day)$^{-1}$	1.5E-05			NA		
				Benzo(b)fluoroanthene	8.4	mg/kg	2.3E-06	mg/kg day	0.73	(mg/kg-day)$^{-1}$	1.7E-06			NA		
				Benzo(k)fluoroanthene	3.1	mg/kg	8.5E-07	mg/kg day	0.07	(mg/kg-day)$^{-1}$	6.2E-08					
				Dibenzo(ah)anthracene	1.9	mg/kg	5.2E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	3.8E-06			NA		
				Indeno(1,2,3-cd)pyrene	6.1	mg/kg	1.7E-06	mg/kg day	0.73	(mg/kg-day)$^{-1}$	1.2E-06			NA		
				Pyrene	8.7	mg/kg	2.4E-06	mg/kg day	NA			0.00001	mg/kg day	0.03	mg/kg day	0.0002
				Arsenic (inorganic)	48.1	mg/kg	1.4E-05	mg/kg day	1.5	(mg/kg-day)$^{-1}$	2.0E-05	0.00004	mg/kg day	0.0003	mg/kg day	0.13
				Chromium (VI)	28	mg/kg	7.6E-06	mg/kg day	0.5	(mg/kg-day)$^{-1}$	3.8E-06	0.00004	mg/kg day	0.003	mg/kg day	0.01
				Cobalt	4.3	mg/kg	2.0E-06	mg/kg day	NA			0.00001	mg/kg day	0.0003	mg/kg day	0.02
				Iron	28,000	mg/kg	1.3E-02	mg/kg day	NA			0.04	mg/kg day	0.7	mg/kg day	0.05
				PCBs	8.0	mg/kg	3.8E-06	mg/kg day	2.0	(mg/kg-day)$^{-1}$	7.5E-06	0.000011	mg/kg day	0.00002	mg/kg day	0.5
			Exp. Route								5.5E-05					0.8
		Residence	Dermal	Benzo(a)anthracene	6.8	mg/kg	9.7E-07	mg/kg day	0.7	(mg/kg-day)$^{-1}$	7.1E-07					
				Benzo(a)pyrene	7.7	mg/kg	1.1E-06	mg/kg day	7.3	(mg/kg-day)$^{-1}$	8.0E-06					
				Benzo(b)fluoroanthene	8.4	mg/kg	1.2E-06	mg/kg day	0.73	(mg/kg-day)$^{-1}$	8.7E-07					
				Benzo(k)fluoroanthene	3.1	mg/kg	4.4E-07	mg/kg day	0.073	(mg/kg-day)$^{-1}$	3.2E-08					
				Dibenzo(ah)anthracene	1.9	mg/kg	2.7E-07	mg/kg day	7.3	(mg/kg-day)$^{-1}$	2.0E-06					
				Indeno(1,2,3-cd)pyrene	6.1	mg/kg	8.7E-07	mg/kg day	0.7	(mg/kg-day)$^{-1}$	6.3E-07					
				Pyrene	8.7	mg/kg	1.2E-06	mg/kg day	NA			0.00000	mg/kg day	0.03	mg/kg day	0.00005
				Arsenic (inorganic)	48.1	mg/kg	2.7E-06	mg/kg day	1.5	(mg/kg-day)$^{-1}$	4.1E-06	0.00001	mg/kg day	0.0003	mg/kg day	0.03
				PCBs	8.0	mg/kg	2.1E-06	mg/kg day	2.0	(mg/kg-day)$^{-1}$	4.2E-06	0.00001	mg/kg day	0.00002	mg/kg day	0.31
			Exp. Route								2.0E-05					0.33
		Residence	Inhalation (Fugitive Dust)	Benzo(a)anthracene	6.8	mg/kg	9.3E-07	ug/m3	0.0001	(ug/m3)$^{-1}$	1.0E-10			NA		
				Benzo(a)pyrene	7.7	mg/kg	1.1E-06	ug/m3	0.001	(ug/m3)$^{-1}$	1.2E-09			NA		
				Benzo(b)fluoroanthene	8.4	mg/kg	1.2E-06	ug/m3	0.0001	(ug/m3)$^{-1}$	1.3E-10			NA		
				Benzo(k)fluoroanthene	3.1	mg/kg	4.2E-07	ug/m3	0.0011	(ug/m3)$^{-1}$	4.7E-10			NA		
				Dibenzo(ah)anthracene	1.9	mg/kg	2.6E-07	ug/m3	0.001	(ug/m3)$^{-1}$	3.1E-10			NA		
				Indeno(1,2,3-cd)pyrene	6.1	mg/kg	8.4E-07	ug/m3	0.0001	(ug/m3)$^{-1}$	9.2E-11			NA		
				Pyrene	8.7	mg/kg	1.2E-06	ug/m3	NA			0.00000001	mg/m3	NA		
				Arsenic (inorganic)	48.1	mg/kg	1.1E-05	ug/m3	0.004	(ug/m3)$^{-1}$	4.9E-08	0.00000003	mg/m3	0.0003	mg/m3	0.00011
				Chromium (VI)	27.73	mg/kg	3.8E-06	ug/m3	0.08	(ug/m3)$^{-1}$	3.2E-07	0.00000002	mg/m3	0.00002	mg/m3	0.001
				Iron	28000	mg/kg	6.6E-03	ug/m3	NA			0.00002	mg/m3	NA	mg/m3	
				PCBs	8.0	mg/kg	1.9E-06	ug/m3	0.00057	(ug/m3)$^{-1}$	1.1E-09	0.000000005	mg/m3	0.00007	mg/m3	0.00008
			Exp. Route								3.7E-07					0.00
		Exposure Point Total									7.6E-05					1.1
	Exposure Medium Total										7.6E-05					1.1
Total											7.6E-05					1.1
							Total of Receptor Risks Across All Media				**7.6E-05**	**Total of Receptor Hazards Across All Media**				**1.1**

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TABLE 7.3. CTE (Property H)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence Property H	Ingestion	Benzo(a)anthracene (< 2 yrs)	1.1	mg/kg	1.0E-07	mg/kg day	7.3	(mg/kg-day)$^{-}$	7.3E-07			NA		
				Benzo(a)anthracene (2 to 6 yrs)	1.1	mg/kg	1.0E-07	mg/kg day	2.2	(mg/kg-day)$^{-}$	2.2E-07			NA		
				Benzo(a)anthracene (6 to <16 yrs)	1.1	mg/kg	1.1E-08	mg/kg day	2.2	(mg/kg-day)$^{-}$	2.4E-08			NA		
				Benzo(a)pyrene (< 2 yrs)	1.1	mg/kg	1.0E-07	mg/kg day	73	(mg/kg-day)$^{-}$	7.3E-06			NA		
				Benzo(a)pyrene (2 to 6 yrs)	1.1	mg/kg	1.0E-07	mg/kg day	21.9	(mg/kg-day)$^{-}$	2.2E-06			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	1.1	mg/kg	1.1E-08	mg/kg day	21.9	(mg/kg-day)$^{-}$	2.4E-07			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	1.3	mg/kg	1.2E-07	mg/kg day	7.3	(mg/kg-day)$^{-}$	8.7E-07			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	1.3	mg/kg	1.2E-07	mg/kg day	2.19	(mg/kg-day)$^{-}$	2.6E-07			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	1.3	mg/kg	1.3E-08	mg/kg day	2.19	(mg/kg-day)$^{-}$	2.8E-08			NA		
				Benzo(k)fluoroanthene (< 2 yrs)	3.1	mg/kg	2.8E-07	mg/kg day	0.73	(mg/kg-day)$^{-}$	2.1E-07					
				Benzo(k)fluoroanthene (2 to 6 yrs)	3.1	mg/kg	2.8E-07	mg/kg day	0.22	(mg/kg-day)$^{-}$	6.2E-08					
				Benzo(k)fluoroanthene (6 to < 16 yrs)	3.1	mg/kg	3.0E-08	mg/kg day	0.22	(mg/kg-day)$^{-}$	6.6E-09					
				Dibenzo(ah)anthracene (< 2 yrs)	0.29	mg/kg	2.6E-08	mg/kg day	73	(mg/kg-day)$^{-}$	1.9E-06			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	0.29	mg/kg	2.6E-08	mg/kg day	21.9	(mg/kg-day)$^{-}$	5.8E-07			NA		
				Dibenzo(ah)anthracene (6 to <16 yrs)	0.29	mg/kg	2.8E-09	mg/kg day	21.9	(mg/kg-day)$^{-}$	6.2E-08			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.73	mg/kg	6.7E-08	mg/kg day	7.3	(mg/kg-day)$^{-}$	4.9E-07			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.73	mg/kg	6.7E-08	mg/kg day	2.2	(mg/kg-day)$^{-}$	1.5E-07			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.73	mg/kg	7.1E-09	mg/kg day	2.2	(mg/kg-day)$^{-}$	1.6E-08			NA		
				Pyrene	8.7				NA			0.0001	mg/kg day	0.03	mg/kg day	0.002
				Pyrene	8.7				NA			0.0001	mg/kg day	0.03	mg/kg day	0.002
				Pyrene	8.7				NA			0.0001	mg/kg day	0.03	mg/kg day	0.002
				Aluminum	9,460	mg/kg	2.6E-03	mg/kg day	NA	(mg/kg-day)$^{-}$		0.06	mg/kg day	1	mg/kg day	0.060
				Arsenic (inorganic)	48.1	mg/kg	7.9E-06	mg/kg day	1.5	(mg/kg-day)$^{-}$	1.2E-05	0.0002	mg/kg day	0.0003	mg/kg day	0.6
				Chromium (VI) (< 2)	27.7	mg/kg	2.5E-06	mg/kg day	5.0	(mg/kg-day)$^{-}$	1.3E-05	0.000	mg/kg day	0.003	mg/kg day	0.1
				Chromium (VI) (2 to 6)	27.7	mg/kg	2.5E-06	mg/kg day	1.5	(mg/kg-day)$^{-}$	3.8E-06	0.000	mg/kg day	0.003	mg/kg day	0.1
				Chromium (VI) (6 to < 16)	27.7	mg/kg	2.7E-07	mg/kg day	1.5	(mg/kg-day)$^{-}$	4.1E-07	0.0000	mg/kg day	0.003	mg/kg day	0.01
				Cobalt	4.3	mg/kg	1.2E-06	mg/kg day	NA			0.0000	mg/kg day	0.0003	mg/kg day	0.1
				Iron	28000	mg/kg	7.7E-03	mg/kg day	NA			0.2	mg/kg day	0.7	mg/kg day	0.3
				PCBs	8.0	mg/kg	2.2E-06	mg/kg day	2.0	(mg/kg-day)$^{-}$	4.4E-06	0.00005	mg/kg day	0.00002	mg/kg day	2.6
			Exp. Route Total								4.9E-05					3.7

TABLE 7.3. CTE (Property H) - (Page 2)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence (Property H)	Dermal													
				Benzo(a)anthracene (< 2 yrs)	1.1	mg/kg	1.5E-08	mg/kg day	7.3	(mg/kg-day)$^{-}$	1.1E-07			NA		
				Benzo(a)anthracene (2 to 6 yrs)	1.1	mg/kg	1.5E-08	mg/kg day	2.2	(mg/kg-day)$^{-}$	3.2E-08			NA		
				Benzo(a)anthracene (6 to <16 yrs)	1.1	mg/kg	1.6E-09	mg/kg day	2.2	(mg/kg-day)$^{-}$	3.5E-09			NA		
				Benzo(a)pyrene (< 2 yrs)	1.1	mg/kg	1.5E-08	mg/kg day	73	(mg/kg-day)$^{-}$	1.1E-06			NA		
				Benzo(a)pyrene (2 to 6 yrs)	1.1	mg/kg	1.5E-08	mg/kg day	21.9	(mg/kg-day)$^{-}$	3.2E-07			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	1.1	mg/kg	1.6E-09	mg/kg day	21.9	(mg/kg-day)$^{-}$	3.5E-08			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	1.3	mg/kg	1.7E-08	mg/kg day	7.3	(mg/kg-day)$^{-}$	1.3E-07			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	1.3	mg/kg	1.7E-08	mg/kg day	2.2	(mg/kg-day)$^{-}$	3.8E-08			NA		
				Benzo(b)fluoroanthene (6 to <16 yrs)	1.3	mg/kg	1.9E-09	mg/kg day	2.2	(mg/kg-day)$^{-}$	4.1E-09			NA		
				Benzo(k)fluoroanthene (< 2 yrs)	3.1	mg/kg	4.1E-08	mg/kg day	0.73	(mg/kg-day)$^{-}$	3.0E-08					
				Benzo(k)fluoroanthene (2 to 6 yrs)	3.1	mg/kg	4.1E-08	mg/kg day	0.2	(mg/kg-day)$^{-}$	9.0E-09					
				Benzo(k)fluoroanthene (6 to <16 yrs)	3.1	mg/kg	4.5E-09	mg/kg day	0.219	(mg/kg-day)$^{-}$	9.8E-10					
				Dibenzo(ah)anthracene (< 2 yrs)	0.29	mg/kg	3.9E-09	mg/kg day	73	(mg/kg-day)$^{-}$	2.8E-07			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	0.29	mg/kg	3.9E-09	mg/kg day	21.9	(mg/kg-day)$^{-}$	8.4E-08			NA		
				Dibenzo(ah)anthracene (6 to < 16 yrs)	0.29	mg/kg	1.6E-09	mg/kg day	21.9	(mg/kg-day)$^{-}$	3.5E-08			NA		
				Pyrene (< 2 yrs)	8.7	mg/kg	NA					0.000002	mg/kg day	0.03	mg/kg day	0.0001
				Pyrene (2 to 6 yrs)	8.7	mg/kg	NA					0.000002	mg/kg day	0.03	mg/kg day	0.0001
				Pyrene (6 to < 16 Yrs.)	8.7	mg/kg	NA					0.0000002	mg/kg day	0.03	mg/kg day	0.00001
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.73	mg/kg	9.7E-09	mg/kg day	7.3	(mg/kg-day)$^{-}$	7.1E-08			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.73	mg/kg	9.7E-09	mg/kg day	21.9	(mg/kg-day)$^{-}$	2.1E-07			NA		
				Indeno(1,2,3-cd)pyrene (6 to <16 yrs)	0.73	mg/kg	1.6E-09	mg/kg day	21.9	(mg/kg-day)$^{-}$	3.5E-08			NA		
				Arsenic (inorganic)	48.1	mg/kg	8.9E-07	mg/kg day	1.5	(mg/kg-day)$^{-}$	1.3E-06	0.00001	mg/kg day	0.0003	mg/kg day	0.03
				PCBs	8.00	mg/kg	3.4E-07	mg/kg day	2	(mg/kg-day)$^{-}$	6.9E-07	0.000008	mg/kg day	0.00002	mg/kg day	0.40
			Exp. Route Total								5E-06					0.44

TABLE 7.3. CTE (Property H) - (Page 3)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence Property H	Inhalation (Fugitive Dust)	Benzo(a)anthracene (< 2 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.001	$(ug/m3)^{-1}$	1.2E-11			NA		
				Benzo(a)anthracene (> 2 to 6 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	3.6E-12			NA		
				Benzo(a)anthracene (6 to < 16 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	3.6E-12			NA		
				Benzo(a)pyrene (< 2 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.01	$(ug/m3)^{-1}$	1.2E-10			NA		
				Benzo(a)pyrene (2 to 6 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.003	$(ug/m3)^{-1}$	3.6E-11			NA		
				Benzo(a)pyrene (6 to < 16 yrs)	1.1	mg/kg	1.1E-08	ug/m3	0.003	$(ug/m3)^{-1}$	3.6E-11			NA		
				Benzo(b)fluoroanthene (< 2 yrs)	1.3	mg/kg	1.3E-08	ug/m3	0.001	$(ug/m3)^{-1}$	1.4E-11			NA		
				Benzo(b)fluoroanthene (2 to 6 yrs)	1.3	mg/kg	1.3E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	4.2E-12			NA		
				Benzo(b)fluoroanthene (6 to < 16 yrs)	1.3	mg/kg	1.3E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	4.2E-12			NA		
				Benzo(k)fluoroanthene (< 2 yrs)	3.1	mg/kg	3.0E-08	ug/m3	0.0011	$(ug/m3)^{-1}$	3.3E-11					
				Benzo(k)fluoroanthene (2 to 6 yrs)	3.1	mg/kg	3.0E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	1.0E-11					
				Benzo(k)fluoroanthene (6 to < 16 yrs)	3.1	mg/kg	3.0E-08	ug/m3	0.0003	$(ug/m3)^{-1}$	1.0E-11			NA		
				Dibenzo(ah)anthracene (< 2 yrs)	0.29	mg/kg	2.8E-09	ug/m3	0.01	$(ug/m3)^{-1}$	3.4E-11			NA		
				Dibenzo(ah)anthracene (2 to 6 yrs)	0.29	mg/kg	2.8E-09	ug/m3	0.004	$(ug/m3)^{-1}$	1.0E-11			NA		
				Dibenzo(ah)anthracene (6 to < 16 yrs)	0.29	mg/kg	2.8E-09	ug/m3	0.004	$(ug/m3)^{-1}$	1.0E-11			NA		
				Indeno(1,2,3-cd)pyrene (< 2 yrs)	0.73	mg/kg	7.1E-09	ug/m3	0.001	$(ug/m3)^{-1}$	7.9E-12			NA		
				Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	0.73	mg/kg	7.1E-09	ug/m3	0.0003	$(ug/m3)^{-1}$	2.4E-12			NA		
				Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	0.73	mg/kg	7.1E-09	ug/m3	0.0003	$(ug/m3)^{-1}$	2.4E-12			NA		
				Pyrene (< 2 years)	8.7	mg/kg	8.5E-08	ug/m3	NA					NA		
				Pyrene (2 to 6 years)	8.7	mg/kg	8.5E-08	ug/m3	NA					NA		
				Pyrene (6 to < 16 years)	8.7	mg/kg	8.5E-08	ug/m3	NA					NA		
				Arsenic (inorganic)	48.10	mg/kg	1.4E-06	ug/m3	0.004	$(ug/m3)^{-1}$	6.1E-09	3.3E-08	mg/m3	0.000015	mg/m3	0.002
				Chromium (VI) (< 2 years)	27.7	mg/kg	2.7E-07	ug/m3	0.8	$(ug/m3)^{-1}$	2.3E-07	1.9E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (2 to 6 years)	27.7	mg/kg	2.7E-07	ug/m3	0.8	$(ug/m3)^{-1}$	2.3E-07	1.9E-08	mg/m3	0.0001	mg/m3	0.0002
				Chromium (VI) (6 to <16 years)	27.7	mg/kg	2.7E-07	ug/m3	0.8	$(ug/m3)^{-1}$	2.3E-07	1.9E-08	mg/m3	0.0001	mg/m3	0.0002
				Cobalt	4.3	mg/kg	1.3E-07	ug/m3	0.009	$(ug/m3)^{-1}$	1.1E-09	2.9E-09	mg/m3	0.000006	mg/m3	0.0005
				PCBs	8.0	mg/kg	2.4E-07	ug/m3	0.001	$(ug/m3)^{-1}$	1.4E-10	5.5E-09	mg/m3	0.00000007	mg/m3	0.078
			Exp. Route Total								6.4E-07					0.08
		Exposure Point Total									5.4E-05					4.17
Exposure Medium Total											5.4E-05					4.2
ırface Soil Total											5.4E-05					4.2
							Total of Receptor Risks Across All Media				5.4E-05	Total of Receptor Hazards Across All Media				4.2

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TABLE 7.4. CTE (Property H)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence (Property H)	Ingestion	Benzo(a)anthracene	1.1	mg/kg	6.5E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	4.7E-08			NA		
				Benzo(a)pyrene	1.1	mg/kg	6.5E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	4.7E-07			NA		
				Benzo(b)fluoroanthene	1.3	mg/kg	7.6E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	5.6E-08			NA		
				Benzo(k)fluoroanthene	3.1	mg/kg	1.8E-07	mg/kg day	0.073	(mg/kg-day)$^{-1}$	1.3E-08			NA		
				Dibenzo(ah)anthracene	0.3	mg/kg	1.7E-08	mg/kg day	7.3	(mg/kg-day)$^{-1}$	1.2E-07			NA		
				Indeno(1,2,3-cd)pyrene	0.7	mg/kg	4.3E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	3.1E-08			NA		
				Pyrene	8.7	mg/kg	5.1E-07	mg/kg day	NA			0.00001	mg/kg day	0.03	mg/kg day	0.0002
				Arsenic (inorganic)	48.1	mg/kg	1.7E-06	mg/kg day	1.5	(mg/kg-day)$^{-1}$	2.5E-06	0.00002	mg/kg day	0.0003	mg/kg day	0.07
				Chromium (VI)	28	mg/kg	1.6E-06	mg/kg day	5.0	(mg/kg-day)$^{-1}$	8.1E-06	0.0000	mg/kg day	0.003	mg/kg day	0.01
				Cobalt	8.3	mg/kg	4.9E-07	mg/kg day	NA			0.00001	mg/kg day	0.0003	mg/kg day	0.02
				Iron	28,000	mg/kg	1.6E-03	mg/kg day	NA			0.02	mg/kg day	0.7	mg/kg day	0.03
				PCBs	8.0	mg/kg	4.7E-07	mg/kg day	2.0	(mg/kg-day)$^{-1}$	9.4E-07	0.000005	mg/kg day	0.00002	mg/kg day	0.27
			Exp. Route								1.2E-05					0.4
		Residence	Dermal	Benzo(a)anthracene	1.1	mg/kg	9.6E-09	mg/kg day	0.7	(mg/kg-day)$^{-1}$	7.0E-09					
				Benzo(a)pyrene	1.1	mg/kg	9.6E-09	mg/kg day	7.3	(mg/kg-day)$^{-1}$	7.0E-08					
				Benzo(b)fluoroanthene	1.3	mg/kg	1.1E-08	mg/kg day	0.73	(mg/kg-day)$^{-1}$	8.3E-09					
				Benzo(k)fluoroanthene	3.1	mg/kg	2.7E-08	mg/kg day	0.073	(mg/kg-day)$^{-1}$	2.0E-09					
				Dibenzo(ah)anthracene	0.3	mg/kg	2.5E-09	mg/kg day	7.3	(mg/kg-day)$^{-1}$	1.8E-08					
				Indeno(1,2,3-cd)pyrene	0.7	mg/kg	6.4E-09	mg/kg day	0.7	(mg/kg-day)$^{-1}$	4.6E-09					
				Pyrene	8.7	mg/kg	7.6E-08	mg/kg day	NA			0.0000002	mg/kg day	0.03	mg/kg day	0.00001
				Arsenic (inorganic)	17.81	mg/kg	3.6E-08	mg/kg day	1.5	(mg/kg-day)$^{-1}$	5.4E-08	0.0000004	mg/kg day	0.0003	mg/kg day	0.001
				PCBs	48.1	mg/kg	4.5E-07	mg/kg day	2.0	(mg/kg-day)$^{-1}$	9.0E-07	0.000005	mg/kg day	0.00002	mg/kg day	0.3
			Exp. Route								7.7E-08					0.3
		Residence	Inhalation (Fugitive Dust)	Benzo(a)anthracene	1.1	mg/kg	6.5E-08	ug/m3	0.0001	(ug/m3)$^{-1}$	7.1E-12			NA		
				Benzo(a)pyrene	1.1	mg/kg	6.5E-08	ug/m3	0.001	(ug/m3)$^{-1}$	7.1E-11			NA		
				Benzo(b)fluoroanthene	1.3	mg/kg	7.6E-08	ug/m3	0.0001	(ug/m3)$^{-1}$	8.4E-12			NA		
				Benzo(k)fluoroanthene	3.1	mg/kg	1.8E-07	ug/m3	0.0001	(ug/m3)$^{-1}$	2.0E-11			NA		
				Dibenzo(ah)anthracene	0.29	mg/kg	1.7E-08	ug/m3	0.001	(ug/m3)$^{-1}$	2.0E-11			NA		
				Indeno(1,2,3-cd)pyrene	0.73	mg/kg	4.3E-08	ug/m3	0.0001	(ug/m3)$^{-1}$	4.7E-12			NA		
				Pyrene	8.7	mg/kg	5.1E-07	mg/kg	NA					NA		
				Arsenic (inorganic)	48.1	mg/kg	2.8E-06	ug/m3	0.004	(ug/m3)$^{-1}$	1.2E-08	0.0000000005	mg/m3	0.0003	mg/m3	0.000002
				Chromium (VI)	27.73	mg/kg	1.6E-06	ug/m3	0.84	(ug/m3)$^{-1}$	1.4E-06	0.0000000003	mg/m3	0.00002	mg/m3	0.00002
				Iron	28000	mg/kg	1.6E-03	ug/m3	NA			0.0000003	mg/m3	0.000006	mg/m3	0.05
				PCBs	8.0	mg/kg	4.7E-07	ug/m3	0.4	(ug/m3)$^{-1}$	1.9E-07	0.00000000008	mg/m3	0.00007	mg/m3	0.000001
			Exp. Route								1.6E-06					0.05
		Exposure Point Total									1.4E-05					0.7
Exposure Medium Total											1.4E-05					0.7
Total											1.4E-05					0.7
							Total of Receptor Risks Across All Media				**1.4E-05**	**Total of Receptor Hazards Across All Media**				**0.7**

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TABLE 10.1.RME (Property H)
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Resident (child) (Property H)	Benzo(a)anthracene (< 2 yrs)	1.8E-05	1.5E-10	6.6E-06		2.5E-05					
			Benzo(a)anthracene (2 to 6 yrs)	1.1E-05	8.8E-11	4.0E-06		1.5E-05					
			Benzo(a)anthracene (6 to <16 yrs)	2.9E-06	2.2E-10	1.5E-06		4.4E-06					
			Benzo(a)pyrene (< 2 yrs)	2.1E-04	1.7E-09	7.5E-05		2.8E-04					
			Benzo(a)pyrene (2 to 6 yrs)	1.2E-04	9.9E-10	4.5E-05		1.7E-04					
			Benzo(a)pyrene (6 to < 16 yrs)	3.3E-05	2.5E-09	1.7E-05		5.0E-05					
			Benzo(b)fluoroanthene (< 2 yrs)	2.2E-05	1.8E-10	8.2E-06		3.1E-05					
			Benzo(b)fluoroanthene (2 to 6 yrs)	1.3E-05	1.1E-10	4.9E-06		1.8E-05					
			Benzo(b)fluoroanthene (6 to < 16 yrs)	3.6E-06	2.7E-10	1.9E-06		5.5E-06					
			Benzo(k)fluoroanthene (< 2 yrs)	8.3E-07	6.7E-11	3.0E-07		1.1E-06					
			Benzo(k)fluoroanthene (2 to 6 yrs)	5.0E-07	4.0E-11	1.8E-07		6.8E-07					
			Benzo(k)fluoroanthene (6 to < 16 yrs)	1.3E-07	1.0E-10	6.9E-08		2.0E-07					
			Dibenzo(ah)anthracene (< 2 yrs)	5.1E-05	4.5E-10	5.5E-08		5.1E-05					
			Dibenzo(ah)anthracene (2 to 6 yrs)	3.0E-05	2.7E-10	1.1E-05		4.1E-05					
			Dibenzo(ah)anthracene (6 to <16 yrs)	8.1E-06	6.7E-10	4.2E-06		1.2E-05					
			Indeno(1,2,3-cd)pyrene (< 2 yrs)	1.6E-05	1.3E-10	5.9E-06		2.2E-05					
			Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	9.8E-06	7.9E-11	3.6E-05		4.6E-05					
			Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	2.6E-06	2.0E-10	1.4E-05		1.7E-05					
			Pyrene (< 2 years)		1.2E-08			1.2E-08	Kidney effects	0.004		0.0003	0.004
			Pyrene (2 to 6 years)		9.1E-07			9.1E-07	Kidney effects	0.004		0.0003	0.004
			Pyrene (6 to < 16 years)		6.8E-07			6.8E-07	Kidney effects	0.0004		0.0003	0.001
			Arsenic (inorganic)	4.7E-05	4.1E-07	6.6E-06		5.4E-05	Hyperpigmentation	1.2	0.002	0.17	1.4
			Chromium (VI) (< 2)	5.1E-05				5.1E-05	NOAEL	0.1	0.0002		0.1
			Chromium (VI) (2 to 6)	3.0E-05				3.0E-05	NOAEL	0.1	0.0002		0.1
			Chromium (VI) (6 to < 16)	8.1E-06				8.1E-06	NOAEL	0.03	0.0002		0.03
			Cobalt		2.3E-09			2.3E-09	Irritation	0.2	0.0005		0.2
			Iron						LOAEL	0.5			0.5
			PCBs	1.80E-05	4.7E-10	6.9E-06		2.5E-05	Immune	5.11	0.08	2.0	7.2
		Exposure Point Total		7.1E-04	2E-06	2E-04		1E-03		7.2	0.08	2.2	9.5
	Exposure Medium Total												
Medium Total													
Receptor Total						Child Risk Total		1E-03			Child HI Total		9.5

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TABLE 10.2.RME (Property H)

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Resident (adult)	Benzo(a)anthracene	1.4E-06	1.0E-10	7.1E-07		2.1E-06					
			Benzo(a)pyrene	1.5E-05	1.20E-09	8.0E-06		2.3E-05					
			Benzo(b)fluoroanthene	1.7E-06	1.30E-10	8.7E-07		2.6E-06					
			Benzo(k)fluoroanthene	6.2E-08	4.70E-10	3.2E-08		9.4E-08					
			Dibenzo(ah)anthracene	3.8E-06	3.10E-10	2.0E-06		5.8E-06					
			Indeno(1,2,3-cd)pyrene	1.2E-06	9.20E-11	6.3E-07		1.8E-06					
			Pyrene						Kidney Effects	0.0002			0.0002
			Arsenic (inorganic)	2.0E-05	4.9E-08	4.1E-06		2.4E-05	Hyperpigmentation	0.1	0.0001	0.00005	0.1
			Chromium (VI)	3.8E-06	3.2E-07			4.1E-06	NOAEL	0.01	0.001	0.03	0.04
			Cobalt						Irritation	0.02			0.02
			Iron						LOAEL	0.05			0.05
			PCBs	7.5E-06	1.10E-09	4.2E-06		1.2E-05	Immune System	0.50	0.00008	0.31	0.8
		Exposure Point Total		5E-05	4E-07	2E-05		7.5E-05		0.7	0.001	0.34	1.1
	Exposure Medium Total							7.5E-05					1.1
Medium Total													
Receptor Total (Adult and Child)				Receptor Risk Total				7.5E-05				Receptor HI Total	1

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TABLE 10.3.CTE (Property H)
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Resident (child)	Benzo(a)anthracene (1 to < 2 yrs)	7.3E-07	1.2E-11	1.1E-07		8.4E-07					
			Benzo(a)anthracene (> 2 to 6 yrs)	2.2E-07	3.6E-12	3.2E-08		2.5E-07					
			Benzo(a)anthracene (6 to <16 yrs)	2.4E-08	3.6E-12	3.5E-09		2.8E-08					
			Benzo(a)pyrene (1 to < 2 yrs)	7.3E-06	1.2E-10	1.1E-06		8.4E-06					
			Benzo(a)pyrene (2 to 6 yrs)	2.2E-06	3.6E-11	3.2E-07		2.5E-06					
			Benzo(a)pyrene (6 to < 16 yrs)	2.4E-07	3.6E-11	3.5E-08		2.8E-07					
			Benzo(b)fluoroanthene (1 to < 2 yrs)	8.7E-07	1.4E-11	1.3E-07		1.0E-06					
			Benzo(b)fluoroanthene (2 to 6 yrs)	2.6E-07	4.2E-12	3.8E-08		3.0E-07					
			Benzo(b)fluoroanthene (6 to < 16 yrs)	2.8E-08	4.2E-12	4.1E-09		3.2E-08					
			Benzo(k)fluoroanthene (1 to < 2 yrs)	2.1E-07	3.3E-11	3.0E-08		2.4E-07					
			Benzo(k)fluoroanthene (2 to 6 yrs)	6.2E-08	1.0E-11	9.0E-09		7.1E-08					
			Benzo(k)fluoroanthene (6 to < 16 yrs)	6.6E-09	1.0E-11	9.8E-10		7.6E-09					
			Dibenzo(ah)anthracene (1 to < 2 yrs)	1.9E-06	3.4E-11	2.8E-07		2.2E-06					
			Dibenzo(ah)anthracene (2 to 6 yrs)	5.8E-07	1.0E-11	8.4E-08		6.6E-07					
			Dibenzo(ah)anthracene (6 to <16 yrs)	6.2E-08	1.0E-11	3.5E-08		9.7E-08					
			Indeno(1,2,3-cd)pyrene (1 to < 2 yrs)	4.9E-07	7.9E-12	7.1E-08		5.6E-07					
			Indeno(1,2,3-cd)pyrene (2 to 6 yrs)	1.5E-07	2.4E-12	2.1E-07		3.6E-07					
			Indeno(1,2,3-cd)pyrene (6 to < 16 yrs)	1.6E-08	2.4E-12	1.3E-06		1.3E-06					
			Pyrene (< 2 yrs)						Kidney effects	0.002		0.0001	0.002
			Pyrene (2 to 6 yrs)						Kidney effects	0.002		0.0001	0.002
			Pyrene (6 to < 16 yrs)						Kidney effects	0.002		0.00001	0.002
			Arsenic (inorganic)	1.2E-05	6.1E-09	1.30E-06		1.3E-05	Hyperpigmentation	0.60	0.002	0.03	0.6
			Chromium (VI) (1 to < 2)	1.3E-05	2.3E-07			1.3E-05	NOAEL	0.1	0.0002		0.1
			Chromium (VI) (2 to 6)	3.8E-06	2.3E-07			4.0E-06	NOAEL	0.1	0.0002		0.1
			Chromium (VI) (6 to < 16)	4.1E-07	2.3E-07			6.4E-07	NOAEL	0.01	0.0002		0.01
			Cobalt		1.1E-09			1.1E-09	Irritation	0.1	0.0005		0.1
			Iron						LOAEL	0.3			0.3
			PCBs	4.4E-06	1.40E-12	6.9E-07		5.1E-06	Immune Effects	2.6	0.08	0.4	3.1
		Exposure Point Total		5E-05	7E-07	6E-06		6E-05		3.8	0.08	0.4	4
	Exposure Medium Total												
Medium Total													
Receptor Total							Receptor Risk Tota	6E-05				Receptor HI Total	4

TABLE 10.4.CTE (Property H)
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult and Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Resident (adult)	Benzo(a)anthracene	4.7E-08	7.1E-12	7.0E-09		5.4E-08					
			Benzo(a)pyrene	4.7E-07	7.1E-11	7.0E-08		5.4E-07					
			Benzo(b)fluoroanthene	5.6E-08	8.4E-12	8.3E-09		6.4E-08					
			Benzo(k)fluoroanthene	1.3E-08	2.0E-11	2.0E-09		1.5E-08					
			Dibenzo(ah)anthracene	1.2E-07	2.0E-11	1.8E-08		1.4E-07					
			Indeno(1,2,3-cd)pyrene	3.1E-08	4.7E-12	4.6E-09		3.6E-08					
			Pyrene						Kidney effects	0.0002		0.00001	0.0002
			Arsenic (inorganic)	2.5E-06	1.2E-08	5.4E-08		2.6E-06	Hyperpigmentation	0.07	0.000002	0.001	0.07
			Chromium (VI)	8.1E-06	1.4E-06			9.5E-06	NOAEL	0.01	0.00002		0.01
			Cobalt						Irritation	0.02			0.02
			Iron						LOAEL	0.03	0.05		0.08
			PCBs	9.4E-07	1.9E-07	9.0E-07		2.0E-06	Immune Effects	0.3	0.000001	0.3	0.6
		Exposure Point Total		1E-05	2E-06	1E-06		1.5E-05		0.4	0.05	0.3	0.8
	Exposure Medium Total							1.5E-05					0.8
Medium Total													
Receptor Total (Adult and Child)							Receptor Risk Total	1.5E-05				Receptor HI Total	0.8

TABLE 1.1 (Property I)
SELECTION OF EXPOSURE PATHWAYS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe	Media	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current / Future	Soil (< 0.5 Feet)	Surface Soil (< 0.5 Feet)	Residence (Property I)	Resident	Adult	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
			Residence (Property I)	Resident	Child (< 16 years)	Ingestion	Quantitative	This pathway is complete. The property is zoned residential and individuals are living on the property.
						Inhalation of Fugitive Dust	Quantitative	
						Dermal Contact	Quantitative	
Future	Subsurface Soil (> 4 Feet)	Subsurface Soil (> 4 Feet)	Residence (Property I)	Construction/ Utility Worker	Adult	Ingestion	Qualitative	This pathway is evaluated qualitative based on a lack of data on chemical concentrations at depth.
						Inhalation of Fugitive Dust	Qualitative	
						Dermal Contact	Qualitative	

TABLE 2.1 (Property I)

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 0.5 Feet)
Exposure Medium: Surface Soil (< 0.5 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)		Maximum Concentration (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (2)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property I)	1336-36-3	Total PCBs	0.11	ND	27.0		mg/kg	SS-29	2/3	27.0	NA	0.2 (Cancer)			Y	ASL
	7440-38-2	Arsenic (inorganic)	7.9	N	17.2		mg/kg	SB-23	4/4	17.2	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	6.6		164	EN	mg/kg	SS-29	4/4	164 EN	NA	0.29 (Cancer)			Y	ASL
	7440-50-8	Copper	41.9		1010	EN	mg/kg	SS-29	4/4	1010 EN	NA	310 (Noncancer)			Y	ASL
	7439-92-1	Lead	169		1470	E	mg/kg	SS-29	6/6	1470 E	NA	400			Y	ASL

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TABLE 2.1 (Property I)

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Surface Soil (< 0.5 Feet)
Exposure Medium: Surface Soil (< 0.5 Feet)

Exposure Point	CAS Number	Chemicals of Potential Concern	Minimum Concentration (Qualifier)		Maximum Concentration (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Concentration Used for Screening (1)	Background Value	Screening Toxicity Value (2)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Surface Soil (Property I)	1336-36-3	Total PCBs	0.11	ND	27.0		mg/kg	SS-29	2/3	27.0	NA	0.2 (Cancer)			Y	ASL
	7440-38-2	Arsenic (inorganic)	7.9	N	17.2		mg/kg	SB-23	4/4	17.2	NA	0.39 (Cancer)			Y	ASL/Known Human Carcinogen
	18540-29-9	Chromium (VI)	6.6		164	EN	mg/kg	SS-29	4/4	164 EN	NA	0.29 (Cancer)			Y	ASL
	7440-50-8	Copper	41.9		1010	EN	mg/kg	SS-29	4/4	1010 EN	NA	310 (Noncancer)			Y	ASL
	7439-92-1	Lead	169		1470	E	mg/kg	SS-29	6/6	1470 E	NA	400			Y	ASL
	7440-66-6	Zinc	179		1090	E	mg/kg	SS-29	4/4	1090 E	NA	2,300 (Noncancer)			N	BSL

Table 2.2. (Property I).
Summary of Data

Chemical	SS-11	SS-12	SS-26	SS-28	SS-29	SB-23	Maximum Concentrations
	Sampling Locations						
Total PCBs			0.110 ND	0.100 (ND)	27	0.100 (ND)	27
Arsenic			13 N	12.8 N	7.9 N	17.2	17.2
Chromium			12.6 EN	14.4 EN	164 EN	6.6	164
Copper			59.3 EN	107 EN	1010 EN	41.9	1010
Lead	913 E	1330 E	254 E	311 E	1470 E	169	1470
Zinc			193 E	227 E	1090 E	172	1090

Total PCBs	Arsenic	Chromium	Copper	Lead	Zinc		Lead
0.055	17.2	6.6	41.9	311	172		
0.055	13	12.6	59.3	913	193		1470
27	12.8	14.4	107	1330	227		1330
	7.9	164	1010	254	1090		913
				169			311
				1470			254
							169
						Average Lead Concentration	741.2

Table 2.3. (Property I)
ProUCL Output Sheet for Total PCBs.

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Total PCBs

General Statistics

Number of Valid Observations	3	Number of Distinct Observations
Number of Missing Values	1	

Warning: This data set only has 3 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Total PCBs was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical res

Table 2.4. (Property I)
ProUCL Output Sheet for Arsenic

Arsenic

General Statistics

Number of Valid Observations	4	Number of Distinct Observations	4
Number of Missing Values	1		

Warning: This data set only has 4 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Arsenic was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Table 2.5. (Property I)
ProUCL Output Sheet for Chromium

Chromium

General Statistics

Number of Valid Observations	4	Number of Distinct Observations	4
Number of Missing Values	1		

Warning: This data set only has 4 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Chromium was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Table 2.6. (Property I)
ProUCL Output Sheet for Copper.

Copper

General Statistics

Number of Valid Observations	4	Number of Distinct Observations	4
Number of Missing Values	1		

Warning: This data set only has 4 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Copper was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Table 2.7. (Property I).
ProUCL Output Sheet for Lead.

Lead

General Statistics			
Number of Valid Observations	6	Number of Distinct Observations	6
Number of Missing Values	1		
Raw Statistics		Log-transformed Statistics	
Minimum	169	Minimum of Log Data	5.13
Maximum	1470	Maximum of Log Data	7.293
Mean	ro	Mean of log Data	6.285
Median	612	SD of log Data	0.929
SD	575.7		
Coefficient of Variation	0.777		
Skewness	0.336		

Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!
If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 6 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.856	Shapiro Wilk Test Statistic	0.881
Shapiro Wilk Critical Value	0.788	Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1215	95% H-UCL	4113
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1989
95% Adjusted-CLT UCL (Chen-1995)	1162	97.5% Chebyshev (MVUE) UCL	2522
95% Modified-t UCL (Johnson-1978)	1220	99% Chebyshev (MVUE) UCL	3570
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.958	Data appear Normal at 5% Significance Level	
Theta Star	773.5		
MLE of Mean	741.2		
MLE of Standard Deviation	757.2		
nu star	11.5		
Approximate Chi Square Value (.05)	4.899	Nonparametric Statistics	
Adjusted Level of Significance	0.0122	95% CLT UCL	1128
Adjusted Chi Square Value	3.467	95% Jackknife UCL	1215
		95% Standard Bootstrap UCL	1098
Anderson-Darling Test Statistic	0.462	95% Bootstrap-t UCL	1514
Anderson-Darling 5% Critical Value	0.706	95% Hall's Bootstrap UCL	993.8
Kolmogorov-Smirnov Test Statistic	0.263	95% Percentile Bootstrap UCL	1090
Kolmogorov-Smirnov 5% Critical Value	0.337	95% BCA Bootstrap UCL	1128
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1766
		97.5% Chebyshev(Mean, Sd) UCL	2209
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3080
95% Approximate Gamma UCL	1740		
95% Adjusted Gamma UCL	2458		
Potential UCL to Use		Use 95% Student's-t UCL	1215

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

TABLE 3.1.RME (Property I)
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Medium: Soil (< 0.5 Feet)
Exposure Medium: Soil (< 0.5 Feet)

Exposure Point	Chemicals of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Surface Soil (< 0.5 Feet) Property I	Total PCBs	mg/kg	9.0	Not Calculated Based on 3 Samples	27	27.0	mg/kg	Maximum Concentration. Only 3 Distinct Values in this dataset	ProUCL 4.00.05
	Arsenic (inorganic)	mg/kg	12.7	Not Calculated Based on 4 Samples	17.2	17.2	mg/kg	Maximum Concentration. Data set is too small to compute reliable and meaningful statistics and estimates.	ProUCL 4.00.05
	Chromium (VI)	mg/kg	49.4	Not Calculated Based on 4 Samples	164 EN	164	mg/kg	Maximum Concentration. Data set is too small to compute reliable and meaningful statistics and estimates.	ProUCL 4.00.05
	Copper	mg/kg	304.6	Not Calculated Based on 4 Samples	1010 EN	1010	mg/kg	Maximum Concentration. Data set is too small to compute reliable and meaningful statistics and estimates.	ProUCL 4.00.05
	Lead	mg/kg	741.2	1215 (95% Student's-t UCL)	1470 E	741.2	mg/kg	Mean value used consistent with Lead Guidance.	ProUCL 4.00.05

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1991	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

USEPA (1991). Risk assessment guidance for Superfund. Volume I. Human health evaluation manual - Supplemental Guidance: Standard default exposure factors." Office of Emergency and Remedial Response (Washington, D.C.) OSWER Directive 9285.6-03. NTIS PB91-921314, 10 p, March 25, 1991.

USEPA (2004). Risk assessment guidance for Superfund (RAGS). Vol 1: human health evaluation manual (part E, supplemental guidance for dermal risk assessment). Final. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. EPA/540/R/99/005.

USEPA (2012). Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil. OSWER 9200.1-113. USEPA, Washington, DC

TABLE 4.1.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 6 years)	6	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	USEPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	6	years	EPA1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December
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TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - FOR CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	200	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 Years)	2	years	EPA 2005	
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (< 2 Years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (2 to 6 Years)	1460	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.2.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (2 years)	730	days/year	EPA 1989	
				AT - NC	Averaging Time Non Cancer (4 years)	1460	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	2	years	EPA 2005	--
				ED	Exposure Duration (2 to 6 Years)	4	years	EPA 2005	
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor	Chemical Specific (1)	unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.97	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	10	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	3650	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.3.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	10	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (6 years)	3650	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 Years)	10	years	EPA1991 and 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION CHEMICALS
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	14	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.4.RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	5110	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	14	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

References:

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TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1991	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemical Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA1991	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	
				CF	Conversion Factor	1.00E-06	kg/mg		Dermal Absorbed Dose (mg/kg day)
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	24	years	EPA 1991	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.5 .RME (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	8760	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	24	years	EPA 1991	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 1991	

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USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response,
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TABLE 4.6. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1999	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
Dermal	Resdent	Child (1 to 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	3	years	EPA 2002	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	1095	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.6.CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer (3 years)	1095	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration	3	years	EPA 2002	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C *CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 1991	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 1991	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

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TABLE 4.7 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - CHILD MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	100	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (< 6 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	2800	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.04	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (< 2 years)	1	year	EPA 2005	
				ED	Exposure Duration (2 - 6 years)	1	year	EPA 2005	
				BW	Body Weight	15	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.7.CTE MMOA (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE -CHEMICALS WITH MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - NC
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (3 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 2002	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (< 2 years)	1	years	EPA 2005	--
				ED	Exposure Duration (2 - 6 years)	1	years	EPA 2005	AT - C *CF
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 2002	
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.8 CTE (MMOA)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE - MUTAGENIC MODE OF ACTION

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	Chemical Specific	mg/kg	See Table 3.1	Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	Mean of IR	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor [1]	Chemical Speicfic	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	yrs	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Child (6 to < 16 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration (6 to 16 years)	1	years	EPA 2005	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	365	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.8 CTE MMOA for Child (6 to < 16 Years) (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHILD (6 TO < 16 YEARS) MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Child (6 to < 16 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer (1 years)	365	days/year	EPA 1989	
Inhalation (Cancer	Resident	Child (1 to 6 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration (6 to < 16 years)	1	years	EPA 2005	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 4.9. CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		CS x IR x CF x FI x RBA x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				RBA	Relative Bioavailability of Arsenic [1]	Chemcial Specific	Unitless	EPA 2012	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 Years)	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact [6]	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	365	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

'(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

References:

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TABLE 4.9 CTE (Page 2)

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug		

References:

USEPA (1989) Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual (Part A). USEPA, Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/I-89/002. December

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TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE - CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg		Chronic Daily Intake (mg/kg day) =
				IR	Ingestion Rate	50	mg/day	EPA 1997	
				CF	Conversion Factor	1.00E-06	kg/mg		
				RBA	Relative Bioavailability Factor (1)	Chemical Specific	Unitless	EPA 2012	CS x IR x CF x RBA X FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested from Contaminated Source	1	unitless	Site Specific	
				EF	Exposure Frequency	350	days/year	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA, 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	
Dermal	Resdent	Adult (> 18 YRS for Chemicals With a Mutagenic Mode of Action	Surface Soil	CS	Chemical Concentration in Soil	See table 3.1	mg/kg		Dermal Absorbed Dose (mg/kg day)
				CF	Conversion Factor	1.00E-06	kg/mg		
				SA	Skin Surface Area Available for Contact	5700	cm^2/event	EPA 2004	CS x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA 2004	
				ABS	Absorption Factor	Chemical Specific	unitless	EPA 2004	
				EF	Exposure Frequency	350	days	EPA 1991	
				ED	Exposure Duration	6	years	EPA 2005 and 1997	
				BW	Body Weight	70	kg	EPA 1991	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
				AT - C	Averaging Time Cancer	25550	days	EPA 1989	

(1) Relative Bioavailability Factor is available for arsenic only. The value of 60% was obtained from Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil (USEPA, 2012 - OSWER Directive - OSWER 9200.1-113).

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TABLE 4.10 CTE (Page 2)
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE FOR CHEMICALS WITH A MUTAGENIC MODE OF ACTION
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium:Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (Non-Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Noncancer)	Calculated	(mg/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (mg/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg	EPA 1991	
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - NC
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - NC	Averaging Time Non Cancer	2190	days/year	EPA 1989	
Inhalation (Cancer	Resident	Adult (> 18 Years)	Surface Soil	CDI	Chronic Daily Intake (Cancer)	Calculated	(ug/m3)	EPA, 2002	Calculation for Indoor Air Chronic Daily Intake (ug/m3)
				C soil	Concentration in soil	Table 3.1	mg/kg		
				EF	Exposure Frequency	350	days/year	EPA 1991	Csoil X EF X ED X ET X (1/VF + !/PEF)
				ED	Exposure Duration Adults (> 18 Years)	6	years	EPA 2005 and 1997	--
				ET	Exposure Time	24 hrs/day X 1 day/24 hours	hours/day X days/hour	EPA 1991	AT - C X CF
				VF	Ventilation Factor	Chemical specific	m3/kg	EPA 2002	
				PEF	Particulate Emission Factor	Chemical specific	m3/kg	EPA 2002	
				AT - C	Averaging Time Cancer	25,550	days	EPA 1989	
				CF	Conversion Factor	0.001	mg/ug	EPA 2002	

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TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor-1016	Chronic	7E-05	mg/kg-day	1E+00	7E-05	mg/kg-day	Developmental (low birth weight)	100	IRIS	03/11/13
Aroclor-1254	Chronic	2E-05	mg/kg-day	1E+00	2E-05	mg/kg-day	immune system	300	IRIS	03/11/13
Arsenic (inorganic)	Chronic	3E-04	mg/kg-day	1E+00	3E-04	mg/kg-day	Hyperpigmentation, keratosis and possible vascular complications	3	IRIS	03/11/13
Chromium (VI)	Chronic	3E-03	mg/kg-day	0.025	8E-05	mg/kg-day	No Observed Adverse Effect Level (Adj)	300	IRIS	03/11/13
Copper	Chronic	4E-02	mg/kg-day	1E+00	4E-02	mg/kg-day	Irritation	(Not Stated)	HEAST	07/01/97

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aroclor 1254	Chronic	7E-08	mg/m3			immune system	100	Route to Route Extrapolation	9/20/2009
Aroclor 1016	Chronic	2E-07	mg/m3			reduced birthweight	300	Route to Route Extrapolation	9/20/2009
Arsenic (inorganic)	Chronic	1.5E-05	mg/m3			Development; cardiovascular system; nervous system; lung; skin	Not Listed	CalEPA	03/11/13
Chromium (VI)	Chronic	1E-04	mg/m3			Lactate dehydrogenase in bronchioalveolar lavage fluid	300	IRIS	03/11/13
Copper	Chronic	NA	mg/m3			NA	NA	IRIS	03/11/13

Definitions

CalEPA - California Environmental Protection Agency
IRIS - Integrated Risk Information System
mg/m3 - milligrams/cubic meter
RfC - Reference Concentration

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units	(1)	Value (2)	Units	(3)	Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/13/2013
Arsenic (inorganic)	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/13/2013
Chromium (VI)	5.0E-01	$(mg/kg\text{-}day)^{-1}$	0.025	2.0E+01	$(mg/kg\text{-}day)^{-1}$	A	NJDEP/CalEPA	03/13/2013
Copper	NA		NA	NA		D	IRIS	3/13/2013

(1) Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment July 2004

(2) Based on oral cancer slope factor for Dermal exposure, if an absorption factor has been applied

(3) Weight of Evidence Cancer Guideline Descriptor

A - Known human carcinogen

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

D - not classifiable as to carcinogenicity..

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Eighteen Mile Creek - Lockport, Niagara County, New York

Chemicals of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description (2)	Unit Risk : Inhalation CSF	
	Value	Units	Value (1)	Units		Source(s)	Date(s) (MM/DD/YYYY)
PCBs (Total)	5.7E-04	$(ug/m3)^{-1}$			B2	IRIS	03/13/2013
PCBs (Total)	1.0E-04	$(ug/m3)^{-1}$			B2	IRIS	03/13/2013
Arsenic (inorganic)	4.3E-03	$(ug/m3)^{-1}$			A	IIRS	03/13/2013
Chromium (VI)	8.4E-02	$(ug/m3)^{-1}$			A	NJDEP/CalEPA	03/13/2013
Copper	NA				D	IRIS	3/13/2013

(1) Based on IRIS file inhalation cancer slope factor for dust or aerosol inhalation

(2) Based on IRIS recommendation when addressing Inhalation of evaporated congeners

TABLE 7.1.RME (Property I)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence (Property I)	Ingestion	Arsenic (inorganic)	17.2	mg/kg	1.1E-05	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.7E-05	0.0001	mg/kg day	0.0003	mg/kg day	0.44
				Chromium (VI) (< 2 Yrs.)	164	mg/kg	6.0E-05	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	3.0E-04	0.002	mg/kg day	0.003	mg/kg day	0.70
				Chromium (VI) (2 to 6)	164	mg/kg	1.2E-04	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.8E-04	0.001	mg/kg day	0.003	mg/kg day	0.35
				Chromium (VI) (6 to < 16 Yrs)	164	mg/kg	3.2E-05	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	4.8E-05	0.0002	mg/kg day	0.003	mg/kg day	0.07
				Copper	1010	mg/kg	1.1E-03	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.01	mg/kg day	0.04	mg/kg day	0.32
				PCBs	27.0	mg/kg	3.0E-05	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	5.9E-05	0.0003	mg/kg day	0.00002	mg/kg day	17.3
			Exp. Route Total								6.0E-04					19.1
			Dermal	PCBs	27.0	mg/kg	1.2E-05	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	2.3E-05	1.4E-04	mg/kg day	0.00002	mg/kg day	6.77
				Arsenic (inorganic)	17.2	mg/kg	1.6E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.4E-06	1.8E-05	mg/kg day	0.0003	mg/kg day	0.06
			Exp. Route Total								2.6E-05					6.8
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	17.2	mg/kg	1.0E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	4.3E-09	1.2E-08	ug/m3	0.00002	mg/m3	0.0008
				Chromium (VI) (< 2 years)	164	mg/kg	3.2E-06	ug/m3	8.4E-01	(ug/m3)$^{-1}$	2.7E-06	1.1E-07	ug/m3	0.0001	mg/m3	0.001
				Chromium (VI) (2 to 6 years)	164	mg/kg	6.4E-06	ug/m3	2.5E-01	(ug/m3)$^{-1}$	1.6E-06	1.1E-07	ug/m3	0.0001	mg/m3	0.001
				Chromium (VI) (6 to < 16 years)	164	mg/kg	1.6E-05	ug/m3	2.5E-01	(ug/m3)$^{-1}$	4.0E-06	1.1E-07	ug/m3	0.0001	mg/m3	0.001
				PCBs	27	mg/kg	1.6E-06	ug/m3	5.7E-04	(ug/m3)$^{-1}$	9.0E-10	1.8E-08	ug/m3	0.00007	mg/m3	0.0003
			Exp. Route Total								8.4E-06					0.004
		Exposure Point Total									6.4E-04					26.0
	Exposure Medium Total										6.4E-04					26.0
Surface Soil Total											6.4E-04					26.0
TOTAL Risk and Hazard Index							**Total of Child Risks Across All Media**				**6.4E-04**	**Total of Child Hazards Across All Media**				**26**

Definitions

RfD - Reference Dose (oral)

RfC - Reference Concentration (inhalation)

TABLE 7.2.RME (Property I)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult (> 18 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence (Property I)	Ingestion	Arsenic (inorganic)	17.2	mg/kg	4.8E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	7.3E-06	0.00001	mg/kg day	0.0003	mg/kg day	0.05
				Chromium (VI)	164	mg/kg	4.5E-05	mg/kg day	5.0E-01	(mg/kg-day)$^{-1}$	2.2E-05	0.0002	mg/kg day	0.003	mg/kg day	0.07
				Copper	1010	mg/kg	4.7E-04	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.001	mg/kg day	0.04	mg/kg day	0.03
				PCBs	27	mg/kg	1.3E-05	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	2.5E-05	0.00004	mg/kg day	0.00002	mg/kg day	1.85
			Exp. Route Total								5.5E-05					2.0
			Dermal	PCBs	27	mg/kg	7.1E-06	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	1.4E-05	2.1E-05	mg/kg day	0.00002	mg/kg day	1.03
				Arsenic (inorganic)	17.2	mg/kg	9.7E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	1.5E-06	2.8E-06	mg/kg day	0.0003	mg/kg day	0.01
			Exp. Route Total								1.6E-05					1.0
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	17.2	mg/kg	4.0E-06	ug/m3	4.3E-03	(ug/m3)$^{-1}$	1.7E-08	1.2E-08	mg/m3	0.00002	mg/m3	0.0008
				Chromium (VI)	164	mg/kg	2.2E-05	ug/m3	8.4E-02	(ug/m3)$^{-1}$	1.9E-06	1.6E-08	mg/m3	0.0001	mg/m3	0.0002
				PCBs	27	mg/kg	6.3E-06	ug/m3	5.7E-04	(ug/m3)$^{-1}$	3.6E-09	6.3E-09	mg/m3	0.00007	mg/m3	0.00009
			Exp. Route Total								1.9E-06					0.001
		Exposure Point Total									7.3E-05					3.0
	Exposure Medium Total										7.3E-05					3.0
Surface Soil Total											7.3E-05					3.0
TOTAL RISKS AND HAZARD QUOTIENT							**Total of Adult Risks Across All Media**				**7.3E-05**	**Total of Adult Hazards Across All Media**				**3**

Definitions

R2-0014801

TABLE 7.3.CTE (Property I)
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Child (< 16 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		Cancer Slope Factor /Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence (Property I)	Ingestion	Arsenic (inorganic)	17.2	mg/kg	2.8E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	4.2E-06	0.0001	mg/kg day	0.0003	mg/kg day	0.22
				Chromium (VI) (< 2)	164	mg/kg	1.5E-05	mg/kg day	5.0E+00	(mg/kg-day)$^{-1}$	7.5E-05	0.001	mg/kg day	0.003	mg/kg day	0.35
				Chromium (VI) (2 to 6)	164	mg/kg	1.5E-05	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.2E-05	0.001	mg/kg day	0.003	mg/kg day	0.35
				Chromium (VI) (6 to < 16 Yrs)	164	mg/kg	1.6E-06	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.4E-06	0.0001	mg/kg day	0.003	mg/kg day	0.04
				Copper	1010	mg/kg	2.8E-04	mg/kg day	NA	(mg/kg-day)$^{-1}$		0.004	mg/kg day	0.04	mg/kg day	0.10
				PCBs	27	mg/kg	7.4E-06	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	1.5E-05	0.0002	mg/kg day	0.00002	mg/kg day	8.63
			Exp. Route Total								1.2E-04					9.7
			Dermal	PCBs	27	mg/kg	1.2E-06	mg/kg day	2.0E+00	(mg/kg-day)$^{-1}$	2.3E-06	2.7E-05	mg/kg day	0.00002	mg/kg day	1.35
				Arsenic (inorganic)	17.2	mg/kg	1.6E-07	mg/kg day	1.5E+00	(mg/kg-day)$^{-1}$	2.4E-07	3.7E-06	mg/kg day	0.0003	mg/kg day	0.01
			Exp. Route Total								2.6E-06					1.4
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	17.2	mg/kg	5.0E-07	ug/m3	4.3E-03	(ug/m3)$^{-1}$	2.2E-09	1.2E-08	ug/m3	0.00002	mg/m3	0.0008
				Chromium (VI) (< 2 years)	164	mg/kg	1.6E-06	ug/m3	8.4E-01	(ug/m3)$^{-1}$	1.3E-06	1.1E-07	ug/m3	0.0001	mg/m3	0.001
				Chromium (VI) (2 to 6 years)	164	mg/kg	1.6E-06	ug/m3	2.5E-01	(ug/m3)$^{-1}$	4.0E-07	1.1E-07	ug/m3	0.0001	mg/m3	0.001
				Chromium (VI) (6 to < 16 years)	164	mg/kg	1.6E-06	ug/m3	2.5E-01	(ug/m3)$^{-1}$	4.0E-07	1.1E-07	ug/m3	0.0001	mg/m3	0.001
				PCBs	27	mg/kg	7.9E-06	ug/m3	5.7E-04	(ug/m3)$^{-1}$	4.5E-09	1.8E-08	ug/m3	0.00007	mg/m3	0.0003
			Exp. Route Total								2.2E-06					0.004
		Exposure Point Total									1.2E-04					11.1
	Exposure Medium Total										1.2E-04					11.1
Surface Soil Total											1.2E-04					11.1
TOTAL							**Total of Child Risks Across All Media**				**1.2E-04**	**Total of Child Hazards Across All Media**				**11.1**

R2-0014802

TABLE 7.4.CTE (Property I)

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current / Future
Receptor Population: Resident
Receptor Age: Adult (> 18 years)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemicals of Potential Concern	Exposure Point Concentration		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		Cancer Slopoe Factor/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Residence (Property I)	Ingestion	Arsenic (inorganic)	17.2	mg/kg	6.1E-07	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.1E-07	0.00001	mg/kg day	0.0003	mg/kg day	0.02
				Chromium (VI)	164	mg/kg	9.6E-06	mg/kg day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	4.8E-06	0.0001	mg/kg day	0.003	mg/kg day	0.04
				Copper	1010	mg/kg	5.9E-05	mg/kg day	NA	$(mg/kg\text{-}day)^{-1}$		0.001	mg/kg day	0.04	mg/kg day	0.02
				PCBs	27.0	mg/kg	1.6E-06	mg/kg day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-06	0.00002	mg/kg day	0.00002	mg/kg day	0.92
			Exp. Route Total								8.9E-06					1.0
			Dermal	PCBs	27.0	mg/kg	2.5E-07	mg/kg day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-07	3.0E-06	mg/kg day	0.00002	mg/kg day	0.15
				Arsenic (inorganic)	17.2	mg/kg	3.5E-08	mg/kg day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-08	4.0E-07	mg/kg day	0.0003	mg/kg day	0.001
			Exp. Route Total								5.6E-07					0.1
			Inhalation (Fugitive Dust)	Arsenic (inorganic)	17.2	mg/kg	1.0E-06	ug/m3	4.3E-03	$(ug/m3)^{-1}$	4.3E-09	1.2E-08	ug/m3	0.00002	mg/m3	0.0008
				Chromium (VI)	164	mg/kg	9.6E-06	ug/m3	8.4E-02	$(ug/m3)^{-1}$	8.1E-07	1.1E-07	ug/m3	0.0001	mg/m3	0.001
				PCBs	27	mg/kg	1.6E-06	ug/m3	5.7E-04	$(ug/m3)^{-1}$	9.0E-10	1.8E-08	ug/m3	0.00007	mg/m3	0.0003
			Exp. Route Total								8.1E-07					0.002
		Exposure Point Total									1.0E-05					1.2
	Exposure Medium Total										1.0E-05					1.2
Surface Soil Total											1.0E-05					1.2
TOTAL							Total of Receptor Risks Across All Media				1.0E-05	Total of Receptor Hazards Across All Media				1.2

Definitions

RfD - Reference Dose (oral)
RfC - Reference Concentration (inhalation)

R2-0014803

TABLE 10.1.RME (Property I)

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future
Receptor Population: Adult/Child
Receptor Age: Child (< 16 Yrs) and Adult (> 18 Yrs)

Medium	Exposure Media	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Child													
Surface Soil (< 0.5 Feet)	Surface Soil (< 0.5 Feet)	Surface Soil < 0.5 Feet (Property I)	Arsenic (inorganic)	1.7E-05	4.3E-09	2.40E-06		1.9E-05	Hyperpigmentation	0.44	0.0008	0.06	0.5
			Chromium (VI) (< 2)	3.0E-04	2.7E-06			3.0E-04	No Observed Adverse Effect Level	0.70	0.001		0.7
			Chromium (VI) (2 to 6)	1.8E-04	1.6E-06			1.8E-04	No Observed Adverse Effect Level	0.35	0.001		0.4
			Chromium (VI) (6 to < 16 YRS)	4.8E-05	4.0E-06			5.2E-05	No Observed Adverse Effect Level	0.07	0.001		0.07
			Copper						Irritation	0.32			0.3
			PCBs	5.9E-05	9.0E-10	2.3E-05		8.2E-05	Immune	17.30	0.0003	6.77	24.1
			Chemical Total (Child)	6.0E-04	8.3E-06	2.3E-05		6.4E-04		19.2	0.004	6.8	26.0
		Exposure Point Total						6.4E-04					26.0
	Exposure Medium Total												
Adult													
Surface Soil (< 0.5 Feet)	Surface Soil (< 0.5 Feet)	Surface Soil < 0.5 Feet (Property I)	Arsenic (inorganic)	7.3E-06	1.7E-08	1.5E-06		8.8E-06	Hyperpigmentation	0.05	0.0008	0.001	0.05
			Chromium (VI)	2.2E-05	1.9E-06			2.4E-05	No Observed Adverse Effect Level	0.07	0.0002		0.07
			Copper						Irritation	0.03			0.03
			PCBs	2.5E-05	3.60E-09	1.4E-05		3.9E-05	Immune	1.85	0.00009	1.03	2.88
			Chemical Total (Adult)	5.4E-05	1.9E-06	1.6E-05		7.2E-05		2.0	0.001	1.0	3.0
		Exposure Point Total (Adult and Child)		6.6E-04	1.0E-05	3.9E-05		7.1E-04					
	Exposure Medium Total							7.1E-04					
Medium Total									Total HI (Child)				26
Receptor Total				**Receptor Risk Total (Child and Adult)**				**7E-04**	Total HI (Adult)				3.0

R2-0014804

TABLE 10.1.CTE

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Eighteen Mile Creek - Lockport, Niagara County, New York

Scenario Timeframe: Current/Future

Receptor Population: Adult/Child

Receptor Age: Child (< 16 Yrs) and Adult (> 18 Yrs)

Medium	Exposure Medium	Exposure Point	Chemicals of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Child													
Surface Soil (< 0.5 Feet)	Surface Soil (0 to 0.5 Feet)	Surface Soil (Property I)	Arsenic (inorganic)	4.2E-06	2.2E-09	2.4E-07		4.4E-06	Hyperpigmentation, keratosis and possible vascular complications	0.22	0.0008	0.01	0.23
			Chromium (VI) (< 2)	7.5E-05	1.3E-06			7.6E-05	NOAEL (Adj)	0.35	0.001		0.35
			Chromium (VI) (2 to 6)	2.2E-05	4.0E-07			2.3E-05	NOAEL (Adj)	0.35	0.001		0.35
			Chromium (VI) (6 to < 16 Yrs))	2.4E-06	4.0E-07			2.8E-06	NOAEL (Adj)	0.04	0.001		0.04
			Copper						Irritation	0.10			0.10
			PCBs	1.5E-05	4.5E-09	2.3E-06		1.7E-05	Immune	8.63	0.0003	1.35	9.98
			Chemical Total	1.2E-04	2.1E-06	2.6E-06		1.2E-04		9.7	0.004	1.4	11.0
		Exposure Point Total (Child)						1.2E-04					11.0
	Exposure Medium Total (Child)							1.2E-04					11.0
Adult													
Surface Soil (< 0.5 Feet)	Surface Soil (< 0.5 Feet)	Surface Soil (Property I)	Arsenic (inorganic)	9.1E-07	4.3E-09	5.2E-08		9.6E-07	Hyperpigmentation, keratosis and possible vascular complications	0.02	0.0008	0.001	0.03
			Chromium (VI)	4.8E-06	8.1E-07			5.6E-06	NOAEL (Adj)	0.04	0.001		0.04
			Copper						Irritation	0.02	0.0003		0.02
			PCBs	3.2E-06	9.0E-10	5.1E-07		3.7E-06	Immune	0.92		0.15	1.07
			Chemical Total	8.9E-06	8.2E-07	5.6E-07		1.0E-05		1.0	0.002	0.001	1.2
		Exposure Point Total (Adult)		8.9E-06	8.2E-07	5.6E-07		4.7E-06					1.2
	Exposure Medium Total (Adult)							4.7E-06					1.2
Medium Total											Receptor HI - Adult		11
Receptor Total (Adult and Child)						Receptor Risk Total		1E-04			Receptor HI - Child		1.2

NEW YORK STATE
OFFICE OF PARKS, RECREATION · HISTORIC PRESERVATION

Andrew M. Cuomo
Governor

Rose Harvey
Commissioner

New York State Office of Parks, Recreation and Historic Preservation

Historic Preservation Field Services Bureau • Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643
www.nysparks.com

October 16, 2012

Charles E. Vandrei
NYSDEC/Bureau of Public Lands
625 Broadway, 5th Floor
Albany, New York 12233-4255
(via email only)

Re: EPA, DEC, DOH, DOS
Flintkote Site Remediation
190-300 Mill St
City of Lockport, Niagara County
12PR03263

Dear Mr. Vandrei:

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8).

Based upon this review, it is the SHPO's opinion that your project will have **No Effect** upon cultural resources in or eligible for inclusion in the National Register of Historic Places.

The SHPO appreciates the opportunity to comment on this information. Please telephone me at ext. 3280 with any questions you may have.

Sincerely,

Nancy Herter

Nancy Herter
Historic Preservation Program Analyst,
Archaeology

Weston Solutions, Inc.
Suite 201
1090 King Georges Post Road
Edison, New Jersey 08837-3703
732-585-4400 • Fax 732-225-7037
www.westonsolutions.com

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REMOVAL SUPPORT TEAM 2
EPA CONTRACT EP-W-06-072

March 11, 2013

Mr. Terry Kish, On-Scene Coordinator
U.S. Environmental Protection Agency, Region II
Removal Action Branch
2890 Woodbridge Avenue
Edison, New Jersey 08837

EPA CONTRACT No.: EP-W-06-072
TDD No.: TO-0027-0122
DOCUMENT CONTROL No.: RST 2-02-F-2325
SUBJECT: FINAL SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN 18 MILE CREEK SITE, 198-300 MILL STREET, LOCKPORT, NIAGARA COUNTY, NEW YORK

Dear Mr. Kish,

Enclosed please find the Final Site-Specific Quality Assurance Project Plan (QAPP) for the soil sampling to be conducted at the 18 Mile Creek Site located at 198-300 Mill Street, Lockport, Niagara County, New York, on March 13, 2013. The U.S. Environmental Protection Agency comments regarding the Draft Site-Specific QAPP have been incorporated.

If you have any questions or comments, please do not hesitate to contact me at (732) 585-4419.

Sincerely,

Weston Solutions, Inc.

Michael Garibaldi

Michael Garibaldi
RST 2 Site Project Manager

Enclosure

cc: TDD File No.: TO-0027-0122

an employee-owned company

In Association with Scientific and Environmental Associates, Inc., H & S Environmental, Inc., and Avatar Environmental, LLC

R2-0014807

FINAL SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN

18 MILE CREEK SITE
198-300 Mill Street, Lockport, Niagara County, New York

NON-TIME CRITICAL

Prepared By:

Removal Support Team 2
Weston Solutions, Inc.
Northeast Division
Edison, New Jersey 08837

DC No.: RST 2-02-F-2325
TDD No.: TO-0027-0122
EPA Contract No.: EP-W-06-072

March 2013

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- Figure 1: Site Location Map
- Figure 2: Site Overview Map

ATTACHMENT B: EPA/ERT SOPs

- SOP No.: 2001 - General Field Sampling Guidelines
- SOP No.: 2006 - Sampling Equipment Decontamination (All Media)
- SOP No.: 2012 - Soil Sampling

LIST OF ACRONYMS

ADR	Automated Data Review
ANSETS	Analytical Services Tracking System
AOC	Acknowledgment of Completion
ASTM	American Society for Testing and Materials
CEO	Chief Executive Officer
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
CFM	Contract Financial Manager
CO	Contract Officer
COI	Conflict of Interest
COO	Chief Operations Officer
CRDL	Contract Required Detection Limit
CRTL	Core Response Team Leader
CRQL	Contract Required Quantitation Limit
CQLOSS	Corporate Quality Leadership and Operations Support Services
CWA	Clean Water Act
DCN	Document Control Number
DESA	Division of Environmental Science and Assessment
DI	Deionized Water
DPO	Deputy Project Officer
DQI	Data Quality Indicator
DQO	Data Quality Objective
EM	Equipment Manager
EDD	Electronic Data deliverable
ENVL	Environmental Unit Leader
EPA	Environmental Protection Agency
ERT	Environmental Response Team
FASTAC	Field and Analytical Services Teaming Advisory Committee
GC/ECD	Gas Chromatography/Electron Capture Detector
GC/MS	Gas Chromatography/Mass Spectrometry
HASP	Health and Safety Plan
HRS	Hazard Ranking System
HSO	Health and Safety Officer
ITM	Information Technology Manager
LEL	Lower Explosive Limit
MSA	Mine Safety Appliances
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NELAC	National Environmental Laboratory Accreditation Conference
NELAP	National Environmental Laboratory Accreditation Program
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration

LIST OF ACRONYMS (Concluded)

OSWER	Office of Solid Waste and Emergency Response
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, Sensitivity
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PIO	Public Information Officer
PM	Program Manager
PO	Project Officer
PRP	Potentially Responsible Party
PT	Proficiency Testing
QA	Quality Assurance
QAL	Quality Assurance Leader
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RC	Readiness Coordinator
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
RSCC	Regional Sample Control Coordinator
RST	Removal Support Team
SARA	Superfund Amendments and Reauthorization Act
SEDD	Staged Electronic Data Deliverable
SOP	Standard Operating Practice
SOW	Statement of Work
SPM	Site Project Manager
START	Superfund Technical Assessment and Response Team
STR	Sampling Trip Report
TAL	Target Analyte List
TCL	Total Compound List
TDD	Technical Direction Document
TDL	Technical Direction Letter
TO	Task Order
TQM	Total Quality Management
TSCA	Toxic Substances Control Act
UFP	Uniform Federal Policy
VOA	Volatile Organic Analysis

CROSSWALK

The following table provides a "cross-walk" between the QAPP elements outlined in the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP Manual), the necessary information, and the location of the information within the text document and corresponding QAPP Worksheet. Any QAPP elements and required information that are not applicable to the project are circled.

QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
Project Management and Objectives			
2.1 Title and Approval Page	- Title and Approval Page	Approval Page	1
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	TOC Approval Page	 2
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	Approval Page	3 4
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications - Special Personnel Training Requirements	2	5 6 7 8
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	1	 9 10
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria	3	11 12
2.7 Secondary Data Evaluation	- Sources of Secondary Data and Information - Secondary Data Criteria and Limitations	1 2	 13

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QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
2.8 Project Overview and Schedule 2.8.1 Project Overview 2.8.2 Project Schedule	- Summary of Project Tasks - Reference Limits and Evaluation - Project Schedule/Timeline	4	14 15 16
Measurement/Data Acquisition			
3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures and Requirements 3.1.2.1 Sampling Collection Procedures 3.1.2.2 Sample Containers, Volume, and Preservation 3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures 3.1.2.4 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures 3.1.2.5 Supply Inspection and Acceptance Procedures 3.1.2.6 Field Documentation Procedures	- Sampling Design and Rationale - Sample Location Map - Sampling Locations and Methods/SOP Requirements - Analytical Methods/SOP Requirements - Field Quality Control Sample Summary - Sampling SOPs - Project Sampling SOP References - Field Equipment Calibration, Maintenance, Testing, and Inspection	5	17 18 19 20 21 22
3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	- Analytical SOPs - Analytical SOP References - Analytical Instrument Calibration - Analytical Instrument and Equipment Maintenance, Testing, and Inspection	6	23 24 25
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal	7	26 27
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	- QC Samples - Screening/Confirmatory Analysis Decision Tree	5	28

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QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records - Analytical Services - Data Management SOPs	6	29 30
Assessment/Oversight			
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments - Audit Checklists - Assessment Findings and Corrective Action Responses	8	31 32
4.2 QA Management Reports	- QA Management Reports		33
4.3 Final Project Report	- Final Report(s)		
Data Review			
5.1 Overview			
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Verification (Step I) Process - Validation (Steps IIa and IIb) Process - Validation (Steps IIa and IIb) Summary - Usability Assessment	9	34 35 36 37

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QAPP Worksheet #1: Title and Approval Page

Title: Site-Specific UFP Quality Assurance Project Plan (QAPP)
Site Name/Project Name: 18 Mile Creek Site
Site Location: 198-300 Mill Street, Lockport, Niagara County, New York
Revision Number: 00
Revision Date: Not Applicable

Weston Solutions, Inc.
Lead Organization

Michael Garibaldi
Weston Solutions, Inc.
1090 King Georges Post Road, Suite 201
Edison, New Jersey 08837
Email: Michael.Garibaldi@westonsolutions.com
Preparer's Name and Organizational Affiliation

March 6, 2013
Preparation Date (Day/Month/Year)

Site Project Manager: Signature 3/11/13

Michael Garibaldi/Weston Solutions, Inc.
Printed Name/Organization/Date

QA Officer/Technical Reviewer: Signature 3/11/13

For Smita Sumbaly/Weston Solution, Inc.
Printed Name/Organization/Date

EPA, Region II On-Scene Coordinator (OSC): Signature

Terry Kish/EPA, Region II
Printed Name/Organization/Date

EPA, Region II Quality Assurance Officer (QAO): Signature

Printed Name/Organization/Date

Document Control Number: RST 2-02-F-2325

QAPP Worksheet #2: QAPP Identifying Information

Site Name/Project Name: 18 Mile Creek Site
Site Location: 198-300 Mill Street, Lockport, Niagara County, New York
Operable Unit: 00
Title: Site-Specific Quality Assurance Project Plan
Revision Number: 00
Revision Date: Not Applicable

1. **Identify guidance used to prepare QAPP:**
   Uniform Federal Policy for Quality Assurance Project Plans. Refer to DESA Methods.
2. **Identify regulatory program:** EPA, Region II
3. **Identify approval entity:** EPA, Region II
4. **Indicate whether the QAPP is a generic or a <u>site-specific</u> QAPP.**
5. **List dates of scoping sessions that were held:** February 26, 2013
6. **List dates and titles of QAPP documents written for previous site work, if applicable:**

   1/31/3013 – Final Site-Specific Quality Assurance Project Plan- Bulk Asbestos Sampling
7. **List organizational partners (stakeholders) and connection with lead organization:**

   None
8. **List data users:** EPA, Region II (see Worksheet #4 for individuals)
9. **If any required QAPP elements and required information are not applicable to the project, then provide an explanation for their exclusion below:**

   None
10. **Document Control Number:** RST 2-02-F-2325

QAPP Worksheet #3: Distribution List

[List those entities to which copies of the approved site-specific QAPP, subsequent QAPP revisions, addenda, and amendments are sent]

QAPP Recipient	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number
Terry Kish	On-Scene Coordinator	EPA, Region II	(732) 321-6641	(732) 906-6182	Kish.Terry@epamail.epa.gov	RST 2-02-F-2325
Michael Garibaldi	Site Project Manager	Weston Solutions, Inc., RST 2	(732) 585-4419	(732) 225-7037	Michael.Garibaldi@westonsolutions.com	RST 2-02-F-2325
Smita Sumbaly	QA Officer	Weston Solutions, Inc., RST 2	(732) 585-4410	(732) 225-7037	S.Sumbaly@westonsolutions.com	RST 2-02-F-2325
Timothy Benton	HSO	Weston Solutions, Inc., RST 2	(732) 585-4425	(732) 225-7037	Timothy.Benton@westonsolutions.com	RST 2-02-F-2325
Site TDD File	RST 2 Site TDD File	Weston Solutions, Inc., RST 2	Not Applicable	Not Applicable	Not Applicable	-

QAPP Worksheet #4: Project Personnel Sign-Off Sheet

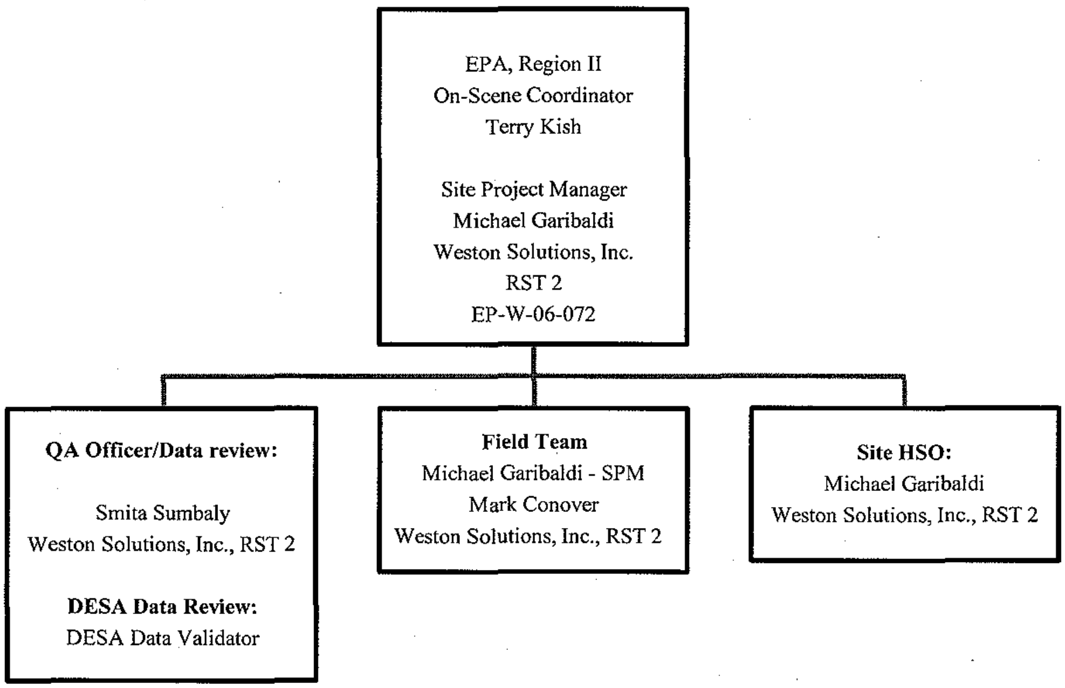
[Copies of this form signed by key project personnel from each organization to indicate that they have read the applicable sections of the site-specific QAPP and will perform the tasks as described; add additional sheets as required. Ask each organization to forward signed sheets to the central project file.]

Organization: Weston Solutions, Inc., RST 2

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Terry Kish	EPA, Region II, On-Scene Coordinator	(732) 321-6641		
for Smita Sumbaly	QAO, RST 2	(732) 585-4410	[signature]	3/11/13
Timothy Benton	HSO, RST 2	(732) 585-4425	[signature]	3/11/13
Michael Garibaldi	Site Lead, RST 2	(732) 585-4419	[signature]	3/11/13
Mark Conover	Field Personnel, RST 2	(732) 585-4440	[signature]	3/11/13

QAPP Worksheet #5: Project Organizational Chart

Identify reporting relationship between all organizations involved in the project, including the lead organization and all contractor and subcontractor organizations. Identify the organizations providing field sampling, on-site and off-site analysis, and data review services, including the names and telephone numbers of all project managers, project team members, and/or project contacts for each organization.



Acronyms:

EPA – U.S. Environmental Protection Agency
HSO – Health & Safety Officer
OSC – On-Scene Coordinator
QAO – Quality Assurance Officer
RST – Removal Support Team
SPM – Site Project Manager
DESA - Division of Environmental Science and Assessment

QAPP Worksheet #6: Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure
Point of contact with EPA OSC	Site Project Manager, Weston Solutions, Inc., RST 2	Michael Garibaldi, SPM	(732) 585-4419	All technical, QA and decision-making matters in regard to the project (verbal, written or electronic)
Adjustments to QAPP	Site Project Manager, Weston Solutions, Inc., RST 2	Michael Garibaldi, SPM	(732) 585-4419	QAPP approval dialogue
Health and Safety On-Site Meeting	Site Project Manager, Weston Solutions, Inc., RST 2	Michael Garibaldi, SPM	(732) 585-4419	Explain/ review site hazards, personnel protective equipment, hospital location, etc.

OSC: On-Scene Coordinator
SPM: Site Project Manager

QAPP Worksheet #7: Personnel Responsibilities and Qualifications Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications*
Terry Kish	EPA On-Scene Coordinator	EPA, Region 2	All project coordination, direction and decision making.	NA
Michael Garibaldi, SPM	Site Project Manager, RST 2	Weston Solutions, Inc.	Implementing and executing the technical, QA and health and safety during sampling event and sample management.	14 years*
Mark Conover	Field Personnel, RST 2	Weston Solutions, Inc.	Sample collection and management	8 Years*

*All RST 2 members, including subcontractor's resumes are in possession of RST 2 Program Manager, EPA Project Officer, and Contracting Officers.

QAPP Worksheet #8: Special Personnel Training Requirements Table

Project Function	Specialized Training By Title or Description of Course	Training Provider	Training Date	Personnel / Groups Receiving Training	Personnel Titles / Organizational Affiliation	Location of Training Records / Certificates[1]
[Specify location of training records and certificates for samplers]						
QAPP Training	This training is presented to all RST 2 personnel to introduce the provisions, requirements, and responsibilities detailed in the UFP QAPP. The training presents the relationship between the site-specific QAPPs, SOPs, work plans, and the Generic QAPP. QAPP refresher training will be presented to all employees following a major QAPP revision.	Weston Solutions, Inc., QAO	As needed	All RST 2 field personnel upon initial employment and as refresher training	Weston Solutions, Inc.	Weston Solutions, Inc., EHS Database
Health and Safety Training	Health and safety training will be provided to ensure compliance with Occupational Safety and Health Administration (OSHA) as established in 29 CFR 1910.120.	Weston Solutions, Inc., HSO	Yearly at a minimum	All Employees upon initial employment and as refresher training every year	Weston Solutions, Inc.	Weston Solutions, Inc., EHS Database
Others	Scribe, ICS 100 and 200, and Air Monitoring Equipment Trainings provided to all employees	Weston Solutions, Inc., QAO/Group Leader's	Upon initial employment and as needed			
	Dangerous Goods Shipping	Weston Solutions, Inc., HSO	Every 2 years			

All team members are trained in the concepts and procedures in recognizing opportunities for continual improvement, and the approaches required to improve procedures while maintaining conformance with legal, technical, and contractual obligations.

[1] All RST 2 members, including subcontractor's certifications are in possession of RST 2 HSO.

QAPP Worksheet #9: Project Scoping Session Participants Sheet

Site Name/Project Name: 18 Mile Creek Site
Site Location: 198-300 Mill Street, Lockport, Niagara County, New York 14094
Operable Unit: 00
Date of Sessions: 2/26/2013
Scoping Session Purpose: To discuss questions, comments, and assumptions regarding technical issues involved with the project.

Name	Title	Affiliation	Phone #	E-mail Address	*Project Role
Terry Kish	EPA OSC	EPA, Region II	(732) 321-6641	Kish.Terry@ epa.epamail.gov	OSC
Michael Garibaldi	Site Project Manager	Weston Solutions, Inc., RST 2	(732) 585-4419	Michael.Garibaldi@ westonsolutions.com	Site Project Management, HSO, Field Lead

Comments/Decisions: As part of the Remedial Investigation (RI), Weston Solutions, Inc., Removal Support Team 2 (RST 2) is tasked with the collection of up to 10 soil samples, including Quality Assurance/ Quality Control (QA/QC) samples, from up to nine properties in the vicinity of the 18 Mile Creek Site (the Site). The soil sampling is tentatively scheduled to be conducted on March 13, 2013. The soil samples will be collected for a definitive data QA objective from the 0 to 6 inch (0-6") depth interval. Field duplicate and Matrix Spike/ Matrix Spike Duplicate (MS/MSD) soil samples will be collected at a rate of one per 20 field samples. One rinsate blank will be collected to demonstrate the adequacy of the decontamination of the non-dedicated sampling equipment. The samples will be submitted to the U.S. Environmental Protection Agency (EPA) Region II, Division of Environmental Science and Assessment (DESA) laboratory for Target Analyte List (TAL) metals (including mercury) and polychlorinated biphenyls (PCB) analyses. The soil samples will be collected to determine if contamination exists at the properties surrounding the Site as determined by the On-Scene Coordinator (OSC) and Remedial Project Manager (RPM). Soil samples will be collected in 4-oz. glass jars as requested by the laboratory.

Action Items: The CLP Request Form was submitted by RST 2 for laboratory procurement on February 27, 2013.

Consensus Decisions: Soil sampling will commence on March 13, 2013 and be completed in one day.

QAPP Worksheet #10: Problem Definition

PROBLEM DEFINITION

Soil sampling will be conducted as part of the RI of the Site. Sampling is scheduled to be conducted on March 13, 2013 and be completed in one day. RST 2 will collect up to 10 surface soil samples from properties located in the vicinity of the Site as determined by the OSC. The analytical data from this investigation will be used to assist EPA in determining if contamination exists at the investigated properties.

SITE HISTORY/CONDITIONS

The Site is located in Niagara County, New York and consists of contaminated sediments, soil and groundwater. The Creek flows north for approximately 15 miles and discharges to Lake Ontario in Olcott, New York. The headwaters consist of an East and West Branch which are immediately north of the New York State Barge Canal. The branches merge to form the main body of the Creek at the Clinton Street bridge in Lockport, New York. The Site has been divided into two parts: the Eighteen Mile Creek Corridor, which extends from the Creek's headwaters at the Barge Canal to Harwood Road in Lockport, and the Sediment Study Area. The Corridor contains most of the Site's legacy contamination. The Corridor includes approximately 4,000 feet of the Creek, as well as properties located along Mill Street, Water Street and Clinton Street in the City of Lockport. The Corridor was the focus of a RI and Supplemental RI completed by the New York State Department of Environmental Conservation (NYSDEC) in 2009. The Creek Sediment Study Area extends from Harwood Road to the Creek's discharge into Lake Ontario and includes numerous contaminated depositional areas. Sediment samples were collected in the Study Area for almost the entire length of the Creek to Burt Dam, and was the focus of a Great Lakes National Program Office (GLNPO) study which was completed in March 2011.

In March 2012, the Site was added to the National Priorities List. Among many other properties, the NPL listing includes the former Flintkote property. The former Flintkote property included a badly deteriorated building which used to derive power from the adjacent 18 Mile Creek. Anecdotal information indicates that PCB containing wastes may have been discharged in such a manner that a significant source of PCBs remains underneath the building. The condition of the building prevents such an assessment, thus the building will be demolished.

PROJECT DESCRIPTION

RST 2 is tasked with the collection of up to 10 soil samples, including QA/QC samples, and one aqueous rinsate blank from properties located in the vicinity of the Site as determined by the OSC. The samples will be submitted to the EPA DESA laboratory for TAL metals (including mercury) and PCB analyses. The soil and rinsate blank samples will be collected for a definitive data QA objective. Field duplicate and MS/MSD soil samples will be collected at a rate of one per every 20 field samples submitted for laboratory analysis.

PROJECT DECISION STATEMENTS

The analytical data from this investigation will be used to assist the EPA in determining whether the soil at the properties adjacent to the Site contain elevated concentrations of TAL metals (including mercury) and PCBs, warranting additional investigation. Analytical data will be compared to the EPA Regional Screening Level (RSL) for Residential Soil.

QAPP Worksheet #11: Project Quality Objectives/Systematic Planning Process Statement

Overall project objectives include: Sampling will be conducted by RST 2 to determine if the soil on the properties contain elevated concentrations of metals and PCBs.

Who will use the data? Data will be used by the EPA, Region II.

What will the data be used for? The analytical data from this investigation will be used to assist the EPA in determining whether the soil at properties adjacent to the Site contain elevated concentrations of metals and PCBs.

What types of data are needed?

Matrix:	Soil samples
Type of Data:	Definitive data for soil samples
Analytical Techniques:	Off-site laboratory analyses
Parameters:	TAL metals (including mercury), PCBs
Type of sampling equipment:	Stainless steel hand augers and trowels, aluminum pie tins, sample jars, and ziplock bags.
Access Agreement:	Obtained by EPA, Region II OSC.
Sampling locations:	The location of the soil samples will be collected from the grass areas of the properties and/or as determined by the OSC.

How much data are needed? Up to 10 soil samples are anticipated to be collected from sample locations at the properties as determined by the OSC.

How "good" does the data need to be in order to support the environmental decision?
Sampling/analytical measurement performance criteria for Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCC) parameters will be established. Refer to Worksheet #12, criteria for performance measurement for definitive data.

Where, when, and how should the data be collected/generated? The soil sample locations at the residential properties will be determined by the EPA OSC. All samples will be collected using methods outlined in the Standard Operating Procedures (SOPs). The sampling event is scheduled to be performed on March 13, 2013.

Who will collect and generate the data? The soil samples will be collected by RST 2. Samples will be analyzed by the EPA DESA laboratory and validated by EPA DESA data validators.

How will the data be reported? All data will be reported by the assigned laboratory (Preliminary, Electronic, and Hard Copy format). The SPM will provide a STR, Status Reports, Maps/Figures, Analytical Report, and Data Validation Report to the EPA OSC.

How will the data be archived? Electronic data deliverables (EDDs) will be archived in a Scribe database.

QAPP Worksheet #12A: Measurement Performance Criteria Table

Complete this worksheet for each matrix, analytical group, and concentration level. Identify the data quality indicators (DQI), measurement performance criteria (MPC) and QC sample and/or activity used to assess the measurement performance for both the sampling and analytical measurement systems. Use additional worksheets if necessary. If MPC for specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet.

Matrix	Soil/Aqueous*
Analytical Group	TAL Metals + mercury
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
EPA/ERT SOPs	C-109 and C-110	Precision	% RPD < 20(Aq), % RPD <25(Soil)	LCS Duplicate	A
		Accuracy	Limits: Average Recovery ± 20% aqueous, ± 25% Soil)	LCS	A
		Accuracy	± 20% aqueous, ± 25% Soil)	Matrix spike	A
		Precision	< RL Except for Al, Fe, Ca, K, Mg and Na	Interference Check Sample (ICP/AES)	A
		Accuracy	< RL	Method Blank	A
		Precision	RPD < 20 %	Serial Dilution Test (ICP/AES)	A
		Accuracy	Range of 0.60-1.87 of the original response in the calibration blank	Internal Standards(ICP-MS)	A

* - Aqueous are rinsate blanks; no MS/MSD and/or field duplicate samples will be collected.

QAPP Worksheet #12B: Measurement Performance Criteria Table

Complete this worksheet for each matrix, analytical group, and concentration level. Identify the data quality indicators (DQI), measurement performance criteria (MPC) and QC sample and/or activity used to assess the measurement performance for both the sampling and analytical measurement systems. Use additional worksheets if necessary. If MPC for specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet.

Matrix	Soil/Aqueous*
Analytical Group	PCB
Concentration Level	Low

Sampling Procedure	**Analytical Method/SOP**	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
EPA/ERT SOPs	C-91	Precision Accuracy	% RPD < 30 Average Recovery 50-150%	LCS Duplicate	A
		Accuracy	Compound Specific (full range: 30-150%)	Matrix spike	A
		Accuracy	Limits 30%-150%	Surrogate Compounds	A
		Accuracy	< RL	Method Blank	A

* - Aqueous are rinsate blanks; no MS/MSD and/or field duplicate samples will be collected.

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QAPP Worksheet #13: Secondary Data Criteria and Limitations Table

Any data needed for project implementation or decision making that are obtained from non-direct measurement sources such as computer databases, background information, technologies and methods, environmental indicator data, publications, photographs, topographical maps, literature files and historical data bases will be compared to the DQOs for the project to determine the acceptability of the data. Thus, for example, analytical data from historical surveys will be evaluated to determine whether they satisfy the validation criteria for the project and to determine whether sufficient data was provided to allow an appropriate validation to be done. If not, then a decision to conduct additional sampling for the site may be necessary.

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data May Be Used (if deemed usable during data assessment stage)	Limitations on Data Use
Previous Investigation Sampling Results	NYSDEC supplied information Various investigations	NYSDEC	To determine which contaminants may extend beyond the Site boundary	EPA Region 2 is conducting a review of this data to determine usability

QAPP Worksheet #14: Summary of Project Tasks

Sampling Tasks: RST 2 will collect up to 10 soil samples from properties in the vicinity of the Site as determined by the OSC. Discreet soil samples will be collected from the 0 to 6 inch (0-6") depth interval at each property. Selective clearing of some vegetation may be required for the collection of the soil samples. Soil sampling will be conducted at up to 9 properties in accordance with the EPA/ERT SOP No. 2012. The OSC will determine the sample location at each property to be sampled. This determination will be made in the field pending access.

The soil and aqueous rinsate samples will be submitted to the EPA DESA laboratory for TAL metals (including mercury) and PCB analyses. The soil samples will be collected for a definitive data QA objective. Field duplicate and MS/MSD samples will be collected at a rate of one per every 20 field samples for soil samples. One rinsate blank will be collected to demonstrate adequate decontamination of non-dedicated sampling equipment. Global Positioning System (GPS) coordinates will be determined for each sample location.

Analysis Tasks:

TAL metals (including mercury) analysis – Soil and Aqueous – DESA Method C-109 and C-110
PCBs – Soil and Aqueous – DESA Method C-91

Quality Control Tasks: Soil samples will be collected for definitive data QA Objective. Field duplicate and MS/MSD samples will be collected at a rate of 1 per every 20 field samples or one per property, whichever is less, for soil samples. One rinsate blank will be collected to demonstrate the adequate decontamination of non-dedicated sampling equipment.

Data Management Tasks:

Activities under this project will be reported in status and trip reports and other deliverables (e.g., analytical reports, final reports) described herein. Activities will also be summarized in appropriate format for inclusion in monthly and annual reports.

The following deliverables will be provided under this project:

Trip Report: A trip report will be prepared to provide a detailed accounting of what occurred during each sampling mobilization. The trip report will be prepared within two weeks of the last day of each sampling mobilization. Information will be provided on time of major events, dates, and personnel on-site (including affiliations).

Maps/Figures: Maps depicting site layout, contaminant source areas, and sample locations will be included in the trip report, as appropriate.

Analytical Report: An analytical report will be prepared for samples analyzed under this plan. Information regarding the analytical methods or procedures employed, sample results, QA/QC results, chain-of-custody (COC) documentation, laboratory correspondence, and raw data will be provided within this deliverable.

QAPP Worksheet #14: Summary of Project Tasks (Continued)

Data Review: A review of the data generated under this plan will be undertaken. The assessment of data acceptability or usability will be provided separately, or as part of the analytical report.

Documentation and Records:

All sample documents will be completed legibly, in ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing the error.

Field Logbook: The field logbook is essentially a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. Field logbook will be bound and paginated. All entries will be dated and signed by the individuals making the entries, and should include (at a minimum) the following

1. Site name and project number
2. Name(s) of personnel on-site
3. Dates and times of all entries (military time preferred)
4. Descriptions of all site activities, site entry and exit times
5. Noteworthy events and discussions
6. Weather conditions
7. Site observations
8. Sample and sample location identification and description*
9. Subcontractor information and names of on-site personnel
10. Date and time of sample collections, along with COC information
11. Record of photographs
12. Site sketches

* The description of the sample location will be noted in such a manner as to allow the reader to reproduce the location in the field at a later date.

Sample Labels: Sample labels will clearly identify the particular sample, and should include the following:

1. Site/project number.
2. Sample identification number.
3. Sample collection date and time.
4. Designation of sample (grab or composite).
5. Sample preservation.
6. Analytical parameters.
7. Name of sampler.

Sample labels will be written in indelible ink and securely affixed to the sample container. Tie-on labels can be used if properly secured.

QAPP Worksheet #14: Summary of Project Tasks (Concluded)

Custody Seals: Custody seals demonstrate that a sample container has not been tampered with or opened. The individual in possession of the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, will be noted in the field logbook.

Assessment/Audit Tasks: No performance audit of field operations is anticipated at this time. If conducted, performance and system audit will be in accordance with the project plan.

Data Review Tasks: All data will be validated by EPA DESA data validators.

Definitive data projects: The data generated under this QA/QC Sampling Plan will be evaluated according to guidance in the Uniform Federal Policy for Implementing Environmental Quality Systems: Evaluating, Assessing and Documenting Environmental Data Collection and Use Programs Part 1: UFP-QAPP (EPA-505-B-04-900A, March 2005); Part 2B: Quality Assurance/Quality Control Compendium: Minimum QA/QC Activities (EPA-505-B-04-900B, March 2005).

Laboratory analytical results will be assessed by the data reviewer for compliance with required precision, accuracy, completeness, representativeness, and sensitivity.

QAPP Worksheet #15A: Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: TAL Metals + mercury
Concentration Level: Low

Analyte	CAS Number	Project (PRP) Quantitation Limit	Achievable Laboratory (DESA) Limits Method CRQLs mg/kg	RLs mg/kg
Aluminum	7429-90-5	NS	*	100
Antimony	7440-36-0	NS	0.22	2
Arsenic	7440-38-2	NS	0.35	0.8
Barium	7440-39-3	NS	0.24	10
Beryllium	7440-41-7	NS	0.02	0.3
Cadmium	7440-43-9	NS	0.02	0.3
Calcium	7440-70-2	NS	12.57	50
Chromium	7440-47-3	NS	0.34	0.5
Cobalt	7440-48-4	NS	0.03	2
Copper	7440-50-8	NS	0.26	1
Iron	7439-89-6	NS	*	5
Lead	7439-92-1	NS	0.23	0.8
Magnesium	7439-95-4	NS	5.06	50
Manganese	7439-96-5	NS	0.33	0.5
Mercury	7439-97-6	NS	.0043	0.05
Nickel	7440-02-0	NS	0.09	2
Potassium	7440-09-7	NS	12.36	50
Selenium	7782-49-2	NS	0.22	2
Silver	7440-22-4	NS	0.06	0.5
Sodium	7440-23-5	NS	22.48	100
Thallium	7440-28-0	NS	3.14	2
Vanadium	7440-62-2	NS	0.40	2
Zinc	7440-66-6	NS	1.57	2

* MDL study cannot be successfully performed on these analytes because of high background levels in matrix (sand).

mg/kg – milligram per kilogram
CRQLs – Contract Required Quantitation Limits
MDL – Minimum Detection Limit
RL – Reporting Limits
NS – not specified

QAPP Worksheet #15B: Reference Limits and Evaluation Table

Matrix: Aqueous[a]
Analytical Group: TAL Metals + mercury
Concentration Level: Low

Analyte	CAS Number	Project (PRP) Quantitation Limit	Method CRQLs μg/L	Achievable Laboratory (DESA) Limits MDLs ug/L	RLs ug/L
Aluminum	7429-90-5	NS	-	93.9	200
Antimony	7440-36-0	NS	2	0.71	20
Arsenic	7440-38-2	NS	1	2.26	8
Barium	7440-39-3	NS	10	0.83	6
Beryllium	7440-41-7	NS	1	0.24	5
Cadmium	7440-43-9	NS	1	0.11	4
Calcium	7440-70-2	NS	-	68.0	1000
Chromium	7440-47-3	NS	2	0.22	6
Cobalt	7440-48-4	NS	1	0.18	8
Copper	7440-50-8	NS	2	5.89	10
Iron	7439-89-6	NS	-	35.6	100
Lead	7439-92-1	NS	1	1.18	7
Magnesium	7439-95-4	NS	-	30..5	1000
Manganese	7439-96-5	NS	1	0.07	5
Mercury	7439-97-6	NS	-	.017	0.2
Nickel	7440-02-0	NS	1	0.46	5
Potassium	7440-09-7	NS	-	53.3	1000
Selenium	7782-49-2	NS	5	1.34	7
Silver	7440-22-4	NS	1	.030	6
Sodium	7440-23-5	NS	-	161	1000
Thallium	7440-28-0	NS	1	1.62	20
Vanadium	7440-62-2	NS	1	2.14	10
Zinc	7440-66-6	NS	2	4.84	8

[a] – Aqueous samples are rinsate blanks and will be collected to assess the adequacy of the decontamination process. Aqueous field duplicate and MS/MSD samples will not be collected.

μg/L – micrograms per liter
CRQLs – Contract Required Quantitation Limits
MDL – Minimum Detection Limit
RL – Reporting Limits
NS – not specified

QAPP Worksheet #15C: Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: PCB Aroclors
Concentration Level: Low

Analyte	CAS Number	Project (PRP) Quantitation Limit [3]	Method QLs µg/kg	Achievable Laboratory (DESA) Limits[2]	
				MDLs µg/kg	RLs µg/kg
alpha-BHC	319-89-6	TBD	1.7	2.15	2.5
gamma-BHC	58-89-9	TBD	1.7	1.89	2.5
beta-BHC	319-85-7	TBD	1.7	1.35	2.5
delta-BHC	319-86-8	TBD	1.7	1.51	2.5
HEPTACHLOR	76-44-8	TBD	1.7	2.05	2.5
ALDRIN	309-00-2	TBD	1.7	1.66	2.5
HEPTACHLOR EPOXIDE	1024-57-3	TBD	1.7	1.34	2.5
gamma-CHLORDANE	5103-74-2	TBD	1.7	0.96	2.5
alpha-CHLORDANE	5103-71-9	TBD	1.7	1.01	2.5
ENDOSULFAN I	1031-07-8	TBD	1.7	1.16	2.5
4,4'-DDE	72-55-9	TBD	3.3	1.92	5.0
DIELDRIN	60-57-1	TBD	3.3	1.91	5.0
ENDRIN	72-20-8	TBD	3.3	1.84	5.0
4,4'-DDD	72-54-8	TBD	3.3	1.35	5.0
ENDOSULFAN II	1031-078	TBD	3.3	1.27	5.0
4,4'-DDT	50-29-3	TBD	3.3	1.52	5.0
ENDRIN ALDEHYDE	7421-93-4	TBD	3.3	2.24	5.0
METHOXYCHLOR	72-43-5	TBD	17	8.00	25
ENDOSULFAN SULFATE	1031-07-8	TBD	3.3	1.24	2.5
ENDRIN KETONE	53494-70-5	TBD	3.3	1.18	2.5
TOXAPHENE	8001-35-2	TBD	170	75.9	190
TECHNICAL CHLORDANE		TBD	--	56.1	62
AROCLOR 1016	12674-11-2	TBD	33	--	31
AROCLOR 1221	11104-28-2	TBD	33	--	62
AROCLOR 1232	11141-16-5	TBD	33	--	31
AROCLOR 1242	53469-21-9	TBD	33	29.9	31
AROCLOR 1248	12672-29-6	TBD	33	--	31
AROCLOR 1254	11097-69-1	TBD	33	--	31
AROCLOR 1260	11096-82-5	TBD	33	--	31
AROCLOR 1262	37324-23-5	TBD	33	--	31
AROCLOR 1268	11100-14-4	TBD	33	--	31

TBD – To be determined

QAPP Worksheet #15D: Reference Limits and Evaluation Table

Matrix: Aqueous
Analytical Group: PCBs
Concentration Level: Low

Analyte	CAS Number	Project (PRP) Quantitation Limit [3]	Method CRQLs µg/L	Achievable Laboratory (DESA) Limits[2]	
				MDLs µg/L	RLs µg/L
alpha-BHC	319-89-6	TBD	0.050	0.001	0.0025
gamma-BHC	58-89-9	TBD	0.050	0.001	0.0025
beta-BHC	319-85-7	TBD	0.050	0.002	0.0025
delta-BHC	319-86-8	TBD	0.050	0.002	0.0025
HEPTACHLOR	76-44-8	TBD	0.050	0.001	0.0025
ALDRIN	309-00-2	TBD	0.050	0.001	0.0025
HEPTACHLOR EPOXIDE	1024-57-3	TBD	0.050	0.005	0.0025
gamma-CHLORDANE	5103-74-2	TBD	0.050	0.001	0.0025
alpha-CHLORDANE	5103-71-9	TBD	0.050	0.002	0.0025
ENDOSULFAN I	1031-07-8	TBD	0.050	0.002	0.0025
4,4'-DDE	72-55-9	TBD	0.10	0.003	0.005
DIELDRIN	60-57-1	TBD	0.10	0.004	0.005
ENDRIN	72-20-8	TBD	0.10	0.004	0.005
4,4'-DDD	72-54-8	TBD	0.10	0..005	0.005
ENDOSULFAN II	1031-078	TBD	0.10	0.004	0.005
4,4'-DDT	50-29-3	TBD	0.10	0.004	0.005
ENDRIN ALDEHYDE	7421-93-4	TBD	0.10	0.006	0.005
METHOXYCHLOR	72-43-5	TBD	0.50	0.032	0.050
ENDOSULFAN SULFATE	1031-07-8	TBD	0.10	0.004	0.005
ENDRIN KETONE	53494-70-5	TBD	0.10	0.004	0.005
TOXAPHENE	8001-35-2	TBD	5.0	0.049	0.1875
TECHNICAL CHLORDANE		TBD	--	0.020	0.0625
AROCLOR 1016	12674-11-2	TBD	1.0	--	0.03125
AROCLOR 1221	11104-28-2	TBD	1.0	--	0.0625
AROCLOR 1232	11141-16-5	TBD	1.0	--	0.03125
AROCLOR 1242	53469-21-9	TBD	1.0	0.020	0.03125
AROCLOR 1248	12672-29-6	TBD	1.0	--	0.03125
AROCLOR 1254	11097-69-1	TBD	1.0	0.014	0.03125
AROCLOR 1260	11096-82-5	TBD	1.0	--	0.03125
AROCLOR 1262	37324-23-5	TBD	1.0	--	0.03125
AROCLOR 1268	11100-14-4	TBD	1.0	--	0.03125

TBD – To be determined

QAPP Worksheet #16: Project Schedule/Timeline Table

Activities	Organization	Dates (MM/DD/YY) Anticipated Date(s) of Initiation	Dates (MM/DD/YY) Anticipated Date of Completion	Deliverable	Deliverable Due Date
Preparation of QAPP	RST 2 Contractor SPM	Prior to sampling date	3/8/2013	QAPP	3/8/2013
Review of QAPP	RST 2 Contractor QAO and/or Group Leader	Prior to sampling date	3/8/2013	Approved QAPP	3/8/2013
Preparation of HASP	RST 2 Contractor SPM	Prior to sampling date	3/8/2013	HASP	3/8/2013
Procurement of Field Equipment	RST 2 Contractor SPM and/or Equipment Officer	Prior to sampling date	3/8/2013	NA	NA
Laboratory Request	Not Applicable	Prior to sampling date	2/27/2013	CLP/Non-CLP Request Form	NA
Field Reconnaissance/Access	RST 2 Contractor SPM; or EPA Region II OSC	3/13/2013	3/13/2013	NA	NA
Collection of Field Samples	RST 2 Contractor SPM	3/13/2013	3/13/2013	NA	NA
Laboratory Electronic Data Received	EPA Region 2 DESA	14 Days After Sampling	14 Days After Sampling	Preliminary Data	14 Days After Sampling
Laboratory Package Received	EPA Region 2 DESA	21 Days After Sampling	21 Days After Sampling	Hard Copy Data Package	21 Days After Sampling
Validation of Laboratory Results	EPA Region 2 DESA	42 Days After Sampling	4/24/2013	Validated Data	4/24/2013
Data Evaluation/ Preparation of Final Report	RST 2 Contractor Site Project Manager	4/24/2013	5/8/2013	Final Report	5/8/2013

QAPP Worksheet #17: Sampling Design and Rationale

RST 2 is tasked with the collection of up to 10 soil samples from up to 9 properties. The soil samples will be submitted to the EPA DESA laboratory for TAL metals (including mercury) and PCB analyses. The soil samples will be collected for a definitive data QA objective. Field duplicate and MS/MSD samples will be collected at a rate of one per every 20 field samples for soil samples submitted for laboratory analysis. One rinsate blank will be collected to demonstrate adequate decontamination of non-dedicated sampling equipment.

SOIL SAMPLING

RST 2 will collect up to 10 soil samples from properties in the vicinity of the Site as determined by the OSC. Discreet soil samples will be collected from the 0 to 6 inch (0-6") depth interval at each property using dedicated and non-dedicated sampling equipment. Selective clearing of some vegetation may be required for the collection of the soil samples. Soil sampling will be conducted at the properties in accordance with the EPA/ERT SOP No. 2012. The OSC will determine the sample location at each property. This determination will be made in the field pending access.

The soil and aqueous rinsate samples will be submitted to the EPA DESA laboratory for TAL metals (including mercury) and PCB analyses. The soil samples will be collected for a definitive data QA objective. Field duplicate and MS/MSD samples will be collected at a rate of one per every 20 field samples for soil samples. Field QA/QC samples may include the collection of one rinsate blank to demonstrate adequate decontamination of non-dedicated sampling equipment. GPS coordinates will be determined for each sample location.

This sampling design is based on information currently available and may be modified onsite in light of field-screening results and other acquired information.

Stainless-steel equipment utilized during the field sampling activities will be decontaminated in accordance to EPA/ERT SOP #2006 prior to and subsequent to sampling. Decontamination of sampling equipment will be conducted as follows:

1. Alconox detergent and potable water scrub.
2. Potable water rinse.
3. Deionized water rinse.
4. 10% Nitric Acid rinse.
5. Deionized water rinse.
6. A hexane rinse (pesticide-grade or better).
7. Air dry (sufficient time will be allowed for the equipment to completely dry).
8. Deionized water rinse and air dry.
9. Wrap or cover exposed ends of sampling equipment with aluminum foil (shiny side out) for transport and handling.

QAPP Worksheet #17: Sampling Design and Rationale (Concluded)

The following laboratories will provide the analyses indicated:

Lab Name/Location	Sample Type	Parameters
EPA Region 2 DESA Laboratory 2890 Woodbridge Ave. Bldg. 209, MS-230 Edison, New Jersey 08837	Soil and Aqueous	TAL metals + mercury, PCBs

Refer to Worksheet #20 for QA/QC samples, sampling methods, and SOPs.

QAPP Worksheet #18: Sampling Locations and Methods/SOP Requirements Table

Matrix	Sampling Location(s)	Units	Analytical Group(s)	Concentration Level	No. of Samples (identify field duplicates)	Sampling SOP Reference	Rationale for Sampling Location
Soil	10	mg/kg	TAL Metals and mercury, PCBs	Low	1/20 duplicate sample per matrix	SOP# 2012	Determine contaminants
Aqueous (Rinsate Blanks)	Rinsate Blanks	Ug/L	TAL Metals and mercury, PCBs	Low	1	SOP# 2006	To determine adequacy of decontamination procedure

The website for EPA-ERT SOPs is: http://www.ert.org/mainContent.asp?section=Products&subsection=List

QAPP Worksheet #19: Analytical SOP Requirements Table

Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/ analysis)
Soil	10	TAL Metals and mercury	Low	C-109 (Ref. EPA 200.7), C-110	250 grams	(1) 4 oz. glass jar w/Teflon lined cap	Cool to 4° C	180 days Hg – 28 days
	10	PCBs	Low	C-91	100 grams	(1) 4 oz. glass jar w/Teflon lined cap	Cool to 4° C	14 days extract; 40 days analyze
Aqueous	1	TAL Metals and Mercury	Low	C-109 (Ref. EPA 200.7) and C-110	1000 ml	(1) 1-Liter Poly Rigid Plastic	HNO3 to pH<2; cool to 4°C	180 days Hg – 28 days
	1	PCBs	Low	C-91	1000 ml	(1) 1L amber glass bottle w/Teflon lined cap	Cool to 4°C	5 days extract; 40 days analyze

* Aqueous samples will consist of rinsate blank samples.

QAPP Worksheet #20: Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of Extra Volume Laboratory QC (e.g., MS/MSD) Samples[1]	No. of Rinsate Blanks[1]	No. of Trip. Blanks	No. of PE Samples
Soil	TAL metals and mercury, PCBs	Low	C-109 (Ref EPA 200.7) and C-110, C-91	10	1 per 20 samples	1 per 20 samples	1 per property or one per day	NR	NR

[1] Only required if non-dedicated sampling equipment to be used.
NR – not required
TAL – target analyte list
TBD – to be determined

QAPP Worksheet #21: Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
SOP#2001	General Field Sampling Guidelines (all media); Rev. 0.0 August 1994	EPA/OSWER/ERT	Site Specific	N	None
SOP#2006	Sampling Equipment Decontamination (all media); Rev 0.0 August 1994	EPA/OSWER/ERT	Non-phosphate Detergent, Tap Water. Distilled/Deionized Water, 10% Nitric Acid, Solvent Rinse (Pesticide Grade)	N	None
SOP #2012	Soil Sampling from the Compendium of ERT Soil Sampling and Surface Geophysics Procedures.	EPA/OSWER/ERT	Stainless steel hand augers and trowels, aluminum pie pans, sample jars	N	None

Note: The website for EPA-ERT SOPs is: www.ert.org/mainContent.asp?section=Products&subsection=List

QAPP Worksheet #22: Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing/ Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
Trimble® GeoXT™ handheld								

QAPP Worksheet #23: Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
C-109	Determination of Trace Elements in Aqueous Trace Metals in Aqueous, Soil/Sediment/Sludge- ICP-AES, Rev 2.0, 3/07	Definitive	TAL Metals	ICP-AES	EPA DESA Laboratory	N
C-110	Determination of Trace Elements in Aqueous Trace Metals in Aqueous, Soil/Sediment/Sludge- ICP-AES, Rev 2.0, 3/07. Mercury analysis is water and soil/sediments by CVAAS, Rev 2.0, 3/07	Definitive	Mercury	CVAA	EPA DESA Laboratory	N
C-91	Analysis of Pesticides and PCBs in Aqueous, Soil/Sediments and Waste Oil/Transformer Fluid Matrices, Rev 2.0, 3/07	Definitive	PCBs	GC-ECD	EPA DESA Laboratory	N

ICP-AES – inductively coupled plasma – atomic emission spectroscopy
TAL – target analyte list
USEPA – U.S. Environmental Protection Agency
DESA - Division of Environmental Science and Assessment

QAPP Worksheet #24: Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
ICP-AES	See SOP C-109	See SOP C-109	See SOP C-109	See SOP C-109	Assigned EPA DESA Laboratory personnel	SOP C-109
CVAA	See SOP C-110	See SOP C-110	See SOP C-110	See SOP C-110	Assigned EPA DESA Laboratory personnel	SOP C-110
GC-ECD	See SOP C-91	See SOP C-91	See SOP C-91	See SOP C-91	Assigned Lab personnel	SOP C-91

[1] Specify the appropriate letter or number form the Analytical SOP References table (Worksheet #23)
CA – corrective action
DESA – Division of Environmental Science and Assessment
EPA – U.S. Environmental Protection Agency
ICP-AES – inductively coupled plasma atomic emission spectroscopy
SOP – standard operating procedure

QAPP Worksheet #25: Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
See list of Instrument given in Worksheet #24	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19

[1] Specify the appropriate letter or number form the Analytical SOP References table (Worksheet #23)

QAPP Worksheet #26: Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): RST 2 Site Project Manager, Weston Solutions, Inc., Region II
Sample Packaging (Personnel/Organization): RST 2 Site Project Manager and sampling team members, Weston Solutions, Inc., Region II
Coordination of Shipment (Personnel/Organization): RST 2 Site Project Manager, sampling team members, Weston Solutions, Inc., Region II
Type of Shipment/Carrier: FedEx and/or hand-delivery
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): OSCAR/DESA LAB, Sample Custodian and EPA RAS Laboratory Sample Custodian
Sample Custody and Storage (Personnel/Organization): OSCAR/DESA LAB, Sample Custodian and EPA RAS Laboratory Sample Custodian
Sample Preparation (Personnel/Organization): OSCAR/DESA LAB, Sample Custodian and EPA RAS Laboratory Sample Custodian
Sample Determinative Analysis (Personnel/Organization): OSCAR/DESA LAB, Sample Custodian and EPA RAS Laboratory Sample Custodian
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples to be shipped same day of collection, and arrive at laboratory within 24 hours (1 day) of sample shipment
Sample Extract/Digestate Storage (No. of days from extraction/digestion): As per analytical methodology; see Worksheet #19
SAMPLE DISPOSAL
Personnel/Organization: OSCAR/DESA LAB, Sample Custodian and EPA RAS Laboratory Sample Custodian
Number of Days from Analysis: Until analysis and QA/QC checks are completed; as per analytical methodology; see Worksheet #19.

QAPP Worksheet #27: Sample Custody Requirements

Sample Identification Procedures: Each sample collected by Region II RST 2 will be designated by a code that will identify the site. The code will be a site-specific property number. The media type will follow the numeric code. A hyphen will separate the site code and media type. Specific media types are as follows: SS – Soil Sample After the media type, the sequential sample numbers will be listed; duplicate samples will be identified in the same manner as other samples and will be distinguished and documented in the field logbook. Example sample location: P008-S001-0006-001 = Property Number 008, Soil Sample Number 001, 0 to 6 Inches in Depth, First Sample From Location.
Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): Each sample will be individually identified and labeled after collection, then sealed with custody seals and enclosed in a plastic cooler. The sample information will be recorded on chain-of custody (COC) forms, and the samples shipped to the appropriate laboratory via overnight delivery service or courier. Chain-of-custody records must be prepared in Scribe to accompany samples from the time of collection and throughout the shipping process. Each individual in possession of the samples must sign and date the sample COC Record. The chain-of-custody record will be considered completed upon receipt at the laboratory. A traffic report and chain-of-custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples are not under direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. Specific information regarding custody of the samples projected to be collected on the weekend will be noted in the field logbook. The chain-of-custody record should include (at minimum) the following: 1) Sample identification number; 2) Sample information; 3) Sample location; 4) Sample date; 5) Sample Time; 6) Sample Type Matrix; 7) Sample Container Type; 8) Sample Analysis Requested; 9) Name(s) and signature(s) of sampler(s); and 10) Signature(s) of any individual(s) with custody of samples. A separate chain-of-custody form must accompany each cooler for each daily shipment. The chain-of-custody form must address all samples in that cooler, but not address samples in any other cooler. This practice maintains the chain-of-custody for all samples in case of mis-shipment.
Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal): A sample custodian at the laboratory will accept custody of the shipped samples, and check them for discrepancies, proper preservation, integrity, etc. If noted, issues will be forwarded to the laboratory manager for corrective action. The sample custodian will relinquish custody to the appropriate department for analysis. At this time, no samples will be archived at the laboratory. Disposal of the samples will occur only after analyses and QA/QC checks are completed.

QAPP Worksheet #28A: QC Samples Table - TAL Metals and Mercury

(UFP-QAPP Manual Section 3.4)
Complete a separate worksheet for each sampling technique, analytical method/SOP, matrix, analytical group, and concentration level. If method/SOP QC acceptance limit exceed the measurement performance criteria, the data obtained may be unusable for making project decisions.

Matrix	Soil/Aqueous[a]
Analytical Group	TAL Metals + mercury
Concentration Level	Low
Sampling SOP(s)	EPA/ERT SOP No. 2012
Analytical Method/SOP Reference	C-109 and C-110 (Ref: EPA 200.7, 245.1)
Sampler's Name	Michael Garibaldi
Field Sampling Organization	Weston Solutions, Inc.
Analytical Organization	EPA DESA Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Tuning/System Stability(ICP-MS)	As per C-112	Pass all the tune/stability criteria	Check Instrument Reanalyze, Retune	Lab personnel	Sensitivity	Pass all the tune/stability criteria
Initial Calibration Verification	Immediately following each calibration ,after every 10 samples and at the end of each analytical run	90%-110%	Check Instrument, Reanalyze	Lab personnel	Accuracy	90%-110%
Continuing Calibration Check Standard (Alternate check standard)	Every 10 samples and at the end of each analytical run	80%-120%	Reanalyze, Qualify data	Lab personnel	Accuracy	80%-120%
Initial Calibration Blank(ICB)	After ICV	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
Continuing Calibration Blank(CCB)	After every CCV	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
Low Level Check Standard	At Beginning and end of each analytical run	± 30% of the true value	Check Instrument, Re-calibrate	Lab personnel	Accuracy	± 30% of the true value
Interference Check Sample(ICP-200.7)	At Beginning and end of each analytical run	< RL Except Al ,Fe, Ca, K, Mg and Na	As per C-109	Lab personnel	Precision	< RL Except Al ,Fe, Ca, K, Mg and Na
Method blank	1 per extraction batch of ≤ 20 samples	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL

[a] Aqueous samples will consist of rinsate blank samples only. Aqueous field duplicate and MS/MSD samples will not be collected.

QAPP Worksheet #28A: QC Samples Table - TAL Metals and Mercury (Concluded)

Matrix	Soil/Aqueous[a]					
Analytical Group	TAL Metals + mercury					
Concentration Level	Low					
Sampling SOP(s)	EPA/ERT SOP No. 2012					
Analytical Method/SOP Reference	C-109 and C-110 (Ref: EPA 200.7, 245.1)					
Sampler's Name	Michael Garibaldi					
Field Sampling Organization	Weston Solutions, Inc.					
Analytical Organization	EPA DESA Laboratory					
No. of Sample Locations	10					
Lab QC Sample:	**Frequency/Number**	**Method/SOP QC Acceptance Limits**	**Corrective Action**	**Person(s) Responsible for Corrective Action**	**Data Quality Indicator (DQI)**	**Measurement Performance Criteria**
LCS/LFB	2 per extraction batch of ≤ 20 samples	Limits: Average Recovery ± 20% aqueous, ± 25% Soil) % RPD < 20(Aq), % RPD <25(Soil)	Qualify data	Lab personnel	Accuracy/ Precision	Limits: Average Recovery ± 20% aqueous, ± 25% Solids) % RPD < 20(Aq), % RPD <25(Soil
Laboratory Matrix spikes	1 per extraction batch of ≤ 20 samples	Limits ± 20% aqueous, ± 25% Soil)	Qualify data	Lab personnel	Accuracy	Limits ± 20% aqueous, ± 25% Soil)
Serial Dilution Test(ICP-200.7)	Matrix spike sample	RPD < 20 %	Qualify data	Lab personnel	Precision	RPD < 20 %
Internal Standards(ICP-MS 200.8)	Each sample, standard, blank	Range of 0.60-1.87 of the original response in the calibration blank	Check Instrument Analyse / Qualify data	Lab personnel	Quantitation	Range of 0.60-1.87 of the original response in the calibration blank

[a] Aqueous samples will consist of rinsate blank samples only. Aqueous field duplicate and MS/MSD samples will not be collected.

QAPP Worksheet #28B: QC Samples Table – PCBs

(UFP-QAPP Manual Section 3.4)

Complete a separate worksheet for each sampling technique, analytical method/SOP, matrix, analytical group, and concentration level. If method/SOP QC acceptance limit exceed the measurement performance criteria, the data obtained may be unusable for making project decisions.

Matrix	Soil/Aqueous[a]
Analytical Group	PCBs
Concentration Level	Low
Sampling SOP	EPA SOP No. 2012
Analytical Method/ SOP Reference	C-91 (Ref: EPA 608)
Sampler's Name	Michael Garibaldi
Field Sampling Organization	Weston Solutions, Inc.
Analytical Organization	EPA DESA Laboratory
No. of Sample Locations	10

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrument Performance (PEM)	Beginning of each analytical run	Total breakdown <30%	Check Instrument	Lab personnel	Sensitivity Contamination	Total breakdown <30%
Initial Calibration	C-91 (Ref: EPA 608)	% RSD +/- 25% Not more than 10% of total analytes failure RSD not more than 30%	Check Instrument, Reanalyze	Lab personnel	Accuracy/ Precision	% RSD +/- 25% Not more than 10% of total analytes failure RSD not more than 30%
Continuing Calibration Check Standard (Alternate check standard)	Beginning and the end of each analytical run	Max %D RRF +/- 25%	Reanalyze, Qualify data	Lab personnel	Accuracy	Max %D RRF +/- 25%
Method Blank	1 per extraction batch	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
LCS/LFB	2 per extraction batch	Limits: Average Recovery 50-150% % RPD < 30	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy/ Precision	Limits: Average Recovery 50-150% % RPD < 30
Laboratory Matrix spikes	1 per extraction batch	Limits 30-150%	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy	Limits 30-150%
Surrogates	Each sample, standard, blank	Limits 30%-150%	Reinject, Qualify data	Lab personnel	Extraction efficiency, Accuracy	Limits 30%-150%

QAPP Worksheet #29: Project Documents and Records Table

Sample Collection Documents and Records	Analysis Documents and Records	Data Assessment Documents and Records	Other
• Field logbooks • COC forms • Field Data Sheets • Photo-document	• Sample receipt logs • Internal and external COC forms • Equipment calibration logs • Sample preparation worksheets/logs • Sample analysis worksheets/run logs • Telephone/email logs • Corrective action documentation	• Data validation reports • Field inspection checklist(s) • Review forms for electronic entry of data into database • Corrective action documentation	CLP Request Form

QAPP Worksheet #30: Analytical Services Table

Matrix	Analytical Group	Concentration Level	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Soil	TAL Metals + mercury	Low	C-109 (Ref. EPA 200.7) and C-110	14 days preliminary	EPA DESA Laboratory	NA
	PCBs	Low	C-91	14 days preliminary	EPA DESA Laboratory	NA

NA – not applicable
SOP – standard operating procedure
TAL – target analyte list

QAPP Worksheet #31: Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions (Title and Organizational Affiliation)
EPA DESA Laboratory							
Proficiency Testing	Semiannually	External	NELAC	PT provider	Lab Personnel	Lab Personnel	Lab QA Officer
NELAC	Every two years	External	NELAC	Florida DOH	Lab QA Officer	Lab Personnel	Florida DOH
Internal Audit	Monthly	Internally	DESA Lab	Lab QA Officer	Lab Personnel	Lab Personnel	Lab QA Officer

QAPP Worksheet #32: Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Project Readiness Review	Checklist or logbook entry	RST 2 Site Project Manager, Weston Solutions, Inc.	Immediately to within 24 hours of review	Checklist or logbook entry	RST 2 Site Project Leader	Immediately to within 24 hours of review
Field Observations/ Deviations from Work Plan	Logbook	RST 2 Site Project Manager, Weston Solutions, Inc. and EPA OSC	Immediately to within 24 hours of deviation	Logbook	RST 2 Site Project Manager and EPA OSC	Immediately to within 24 hours of deviation
EPA DESA Laboratory						
Proficiency Testing	Letter with PT failure indicated	Lab QA Officer	30 days after the audit	Investigate the reason for the PT failure	Lab QA Officer	45 days after the CA report
NELAC	Audit Report with Non-conformance to QAPP, SOPs, NELAC+LQMP	Lab Management	30 days after the audit	Investigate and have a corrective action plan for the deficiencies	Florida DOH	30 days after receiving notification
Internal	Audit Report with Non-conformance to QAPP, SOPs, NELAC Regulations	Lab Management	30 days after the audit	Investigate and have a corrective action plan for the deficiencies	Lab QA Officer	45 days after the CA report

QAPP Worksheet #33: QA Management Reports Table

Type of Report	Frequency (Daily, weekly, monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
EPA-DESA Laboratory				
EPA-DESA Laboratory (preliminary)	As performed	2 weeks from the sampling date	EPA DESA Laboratory	Adly Michael, RSCC, EPA Region II, RST 2 Data Validator and RST 2 SPM, Weston Solutions, Inc.
EPA-DESA Laboratory (validated)	As performed	Up to 21 days after receipt of preliminary data	EPA Region II Data Validator	RST 2 SPM, Weston Solutions, Inc., and OSC, EPA Region II
On-Site Field Inspection	As performed	7 calendar days after completion of the inspection	RST 2 HSO	RST 2 SPM, Weston Solutions, Inc.
Field Change Request	As required per field change	3 days after identification of need for field change	RST 2 SPM	EPA OSC
Final Report	As performed	2 weeks after receipt of EPA approval of data package	RST 2 SPM	EPA OSC

QAPP Worksheet #34: Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Site/field logbooks	Field notes will be prepared daily by the RST 2 Site Project Manager and will be complete, appropriate, legible and pertinent. Upon completion of field work, logbooks will be placed in the project files.	I	RST 2 Site Project Manager
Chains of custody	COC forms will be reviewed against the samples packed in the specific cooler prior to shipment. The reviewer will initial the form. An original COC will be sent with the samples to the laboratory, while copies are retained for (1) the Sampling Trip Report and (2) the project files.	I	RST 2 Site Project Manager
Sampling Trip Reports	STRs will be prepared for each week of field sampling. Information in the STR will be reviewed against the COC forms, and potential discrepancies will be discussed with field personnel to verify locations, dates, etc.	I	RST 2 Site Project Manager
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	E	EPA DESA Laboratory
Laboratory analytical data package	Data packages will be reviewed as to content and sample information upon receipt by EPA.	I	DESA Data Validation Personnel
Final Sample Report	The project data results will be compiled in a sample report for the project. Entries will be reviewed/verified against hardcopy information.	I	RST 2 Site Project Manager
EPA DESA Laboratory			
Chain of Custody	Chain-of-custody forms will be verified against the sample cooler they represent. Sample Acceptance Checklist is completed. The OSCAR staff supervisor utilizes the analyses request information and the external COC to review the accuracy and completeness of LIMS log-in entries, as reflected on the LIMS Sample Receipt Form Details can be found in Laboratory Quality Management Plan, SOP G-25	I	OSCAR Personnel DESA LAB

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QAPP Worksheet #34: Verification (Step I) Process Table (Concluded)

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Analytical data package/ Final Report	The procedures for data review : 1- Data reduction/review by Primary Analyst. 2- Review complete data package (raw data) by independent Peer Reviewer 3- The Sample Project Coordinator reviews the project documentation for completeness followed by a QA review by the QAO 4- Final review by Branch Chief/Section Chief prior to release, this review is to ensure completeness and general compliance with the objectives of the project. This final review typically does not include a review of raw data. Details can be found in Laboratory Quality Management Plan.	I	Primary Analyst, Peer Reviewer, Sample Project Coordinator, Quality Assurance Officer, Section Chief/ Branch Chief. DESA LAB

QAPP Worksheet #35: Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	RST 2 Site Project Manager
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	RST 2 Site Project Manager
EPA DESA Laboratory			
	Chain of Custody	Chain-of-custody forms will be verified against the sample cooler they represent. Sample Acceptance Checklist is completed. The OSCAR staff supervisor utilizes the analyses request information and the external COC to review the accuracy and completeness of LIMS log-in entries, as reflected on the LIMS Sample Receipt Form Details can be found in Laboratory Quality Management Plan, SOP G-25	OSCAR Personnel DESA LAB
	Analytical data package/ Final Report	The procedures for data review : 1- Data reduction/review by Primary Analyst. 2- Review complete data package (raw data) by independent Peer Reviewer 3- The Sample Project Coordinator reviews the project documentation for completeness followed by a QA review by the QAO 4- Final review by Branch Chief/Section Chief prior to release, this review is to ensure completeness and general compliance with the objectives of the project. This final review typically does not include a review of raw data. Details can be found in Laboratory Quality Management Plan.	Primary Analyst, Peer Reviewer, Sample Project Coordinator, Quality Assurance Officer, Section Chief/ Branch Chief. DESA LAB

QAPP Worksheet #35: Validation (Steps IIa and IIb) Process Table (Concluded)

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
EPA DESA Laboratory			
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	DESA Data Validation Personnel
IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	DESA Data Validation Personnel
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	DESA Data Validation Personnel
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	DESA Data Validation Personnel

QAPP Worksheet #36: Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa / IIb	Soil	TAL Metals + mercury	Low	DESA Data Validation SOP for Analysis of Low Concentration for Total Metals + mercury	DESA Data Validation Personnel
IIa / IIb	Soil	PCBs	Low	DESA Data Validation SOP for Analysis of Low Concentration for PCBs	DESA Data Validation Personnel

QAPP Worksheet #37: Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: Data, whether generated in the field or by the laboratory, are tabulated and reviewed for Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCCS) by the SPM for field data or the data validator for laboratory data. The review of the PARCC DQIs will compare with the DQO detailed in the site-specific QAPP, the analytical methods used and impact of any qualitative and quantitative trends will be examined to determine if bias exists. A hard copy of field data is maintained in a designated field or site logbook. Laboratory data packages are validated, and final data reports are generated. All documents and logbooks are assigned unique and specific control numbers to allow tracking and management.
Questions about Non-CLP data, as observed during the data review process, are resolved by contacting the respective site personnel and laboratories as appropriate for resolution. All communications are documented in the data validation record with comments as to the resolution to the observed deficiencies.

Where applicable, the following documents will be followed to evaluate data for fitness in decision making: EPA QA/G-4, *Guidance on Systematic Planning using the Data Quality Objectives Process*, EPA/240/B-06/001, February 2006, and EPA QA/G-9R, *Guidance for Data Quality Assessment*, A reviewer's Guide EPA/240/B-06/002, February 2006.

Describe the evaluative procedures used to assess overall measurement error associated with the project:
As delineated in the ***Uniform Federal Policy for Implementing Environmental Quality Systems: Evaluating, Assessing and Documenting Environmental Data Collection and Use Programs Part 1: UFP-QAPP (EPA-505-B-04-900A, March 2005); Part 2A: UFP-QAPP Workbook (EPA-505-B-04-900C, March 2005); Part 2B: Quality Assurance/Quality Control Compendium: Non-Time Critical QA/QC Activities (EPA-505-B-04-900B, March 2005);*** "Graded Approach" will be implemented for data collection activities that are either exploratory or small in nature or where specific decisions cannot be identified, since this guidance indicates that the formal DQO process is not necessary.

The data will be evaluated to determine whether they satisfy the PQO for the project. The validation process determines if the data satisfy the QA criteria. After the data pass the data validation process, comparison results with the PQO is done.

QAPP Worksheet #37: Usability Assessment (Concluded)

The EPA will use the analytical data from this investigation to determine if the soil at the Site contains elevated concentrations of TAL metals (including mercury) and PCBs, warranting additional investigation.

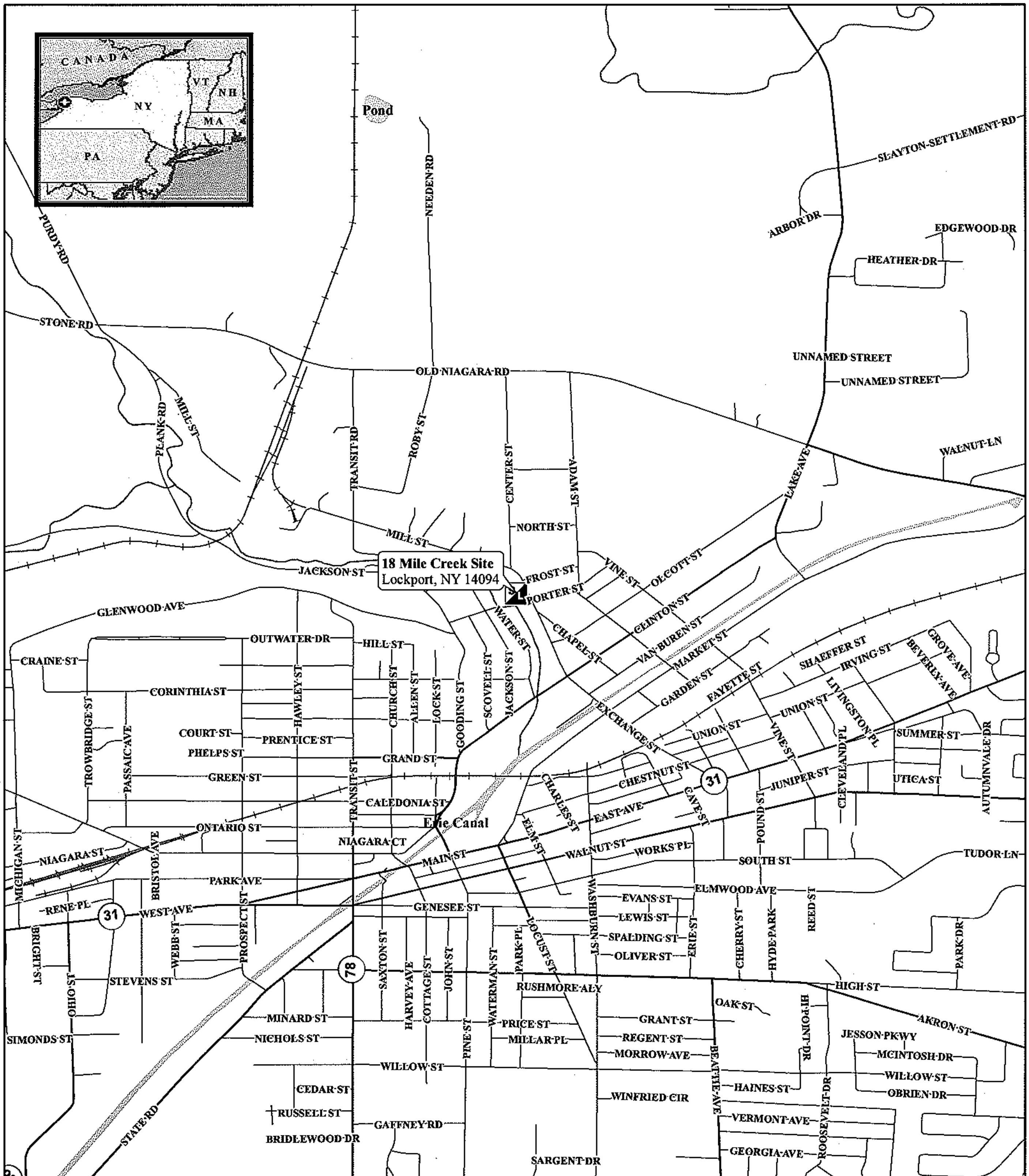
Identify the personnel responsible for performing the usability assessment: SPM, Data Validation Personnel, and EPA, Region II OSC

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

A copy of the most current approved QAPP, including any graphs, maps and text reports developed will be provided to all personnel identified on the distribution list.

ATTACHMENT A

Figure 1: Site Location Map
Figure 2: Site Overview Map



Legend

Note: Former Flintkote Building/Property Site

Site Location

0 0.1 0.2 0.4 0.6 0.8 Miles

N

WESTON SOLUTIONS Weston Solutions, Inc.
Northeast Division

In Association With
H & S Environmental, Inc.,
Scientific and Environmental Associates, Inc.
and Avatar Environmental, LLC.

DATE MODIFIED: 1/16/2013

Figure 1:
Site Location Map

18 MILE CREEK SITE
LOCKPORT, NEW YORK

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL SUPPORT TEAM 2
CONTRACT # EP-W-06-072

GIS ANALYST:	T. BENTON
EPA OSC:	T. KISH
RST SPM:	M. GARIBALDI
FILENAME:	SITE LOCATION MAP.MXD

R2-0014865

Weston Solutions, Inc.
Northeast Division

Restoring Resource Efficiency

IN ASSOCIATION WITH
SCIENTIFIC AND ENVIRONMENTAL ASSOCIATES, INC., H&S ENVIRONMENTAL, INC. AND AVATAR ENVIRONMENTAL SOLUTIONS, LLC

FIGURE 2: Site Overview Map
18 Mile Creek Site
Lockport, Niagara County, New York

U.S ENVIRONMENTAL PROTECTION AGENCY
REMOVAL SUPPORT TEAM 2
CONTRACT # EP-W-06-072

EPA OSC:	Terry Kish
RST 2 SPM:	Michael Garibaldi

R2-0014866

ATTACHMENT B

EPA/ERT SOPs

SOP No.: 2001 - General Field Sampling Guidelines
SOP No.: 2006 - Sampling Equipment Decontamination (All Media)
SOP No.: 2012 - Soil Sampling

GENERAL FIELD SAMPLING GUIDELINES

SOP#: 2001
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide general field sampling guidelines that will assist REAC personnel in choosing sampling strategies, location, and frequency for proper assessment of site characteristics. This SOP is applicable to all field activities that involve sampling.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Sampling is the selection of a representative portion of a larger population, universe, or body. Through examination of a sample, the characteristics of the larger body from which the sample was drawn can be inferred. In this manner, sampling can be a valuable tool for determining the presence, type, and extent of contamination by hazardous substances in the environment.

The primary objective of all sampling activities is to characterize a hazardous waste site accurately so that its impact on human health and the environment can be properly evaluated. It is only through sampling and analysis that site hazards can be measured and the job of cleanup and restoration can be accomplished effectively with minimal risk. The sampling itself must be conducted so that every sample collected retains its original physical form and chemical composition. In this way, sample integrity is insured, quality assurance standards are maintained, and the sample can accurately represent the larger body of material under investigation.

The extent to which valid inferences can be drawn from a sample depends on the degree to which the sampling effort conforms to the project's objectives. For example, as few as one sample may produce adequate, technically valid data to address the project's objectives. Meeting the project's objectives requires thorough planning of sampling activities, and implementation of the most appropriate sampling and analytical procedures. These issues will be discussed in this procedure.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected, and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest. Sample preservation, containers, handling, and storage for air and waste samples are discussed in the specific SOPs for air and waste sampling techniques.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

The nature of the object or materials being sampled may be a potential problem to the sampler. If a material is homogeneous, it will generally have a uniform composition throughout. In this case, any sample increment can be considered representative of the material. On the other hand, heterogeneous samples present problems to the sampler because of changes in the material over distance, both laterally and vertically.

Samples of hazardous materials may pose a safety threat to both field and laboratory personnel. Proper health and safety precautions should be implemented when handling this type of sample.

Environmental conditions, weather conditions, or non-target chemicals may cause problems and/or interferences when performing sampling activities or when sampling for a specific parameter. Refer to the specific SOPs for sampling techniques.

5.0 EQUIPMENT/APPARATUS

The equipment/apparatus required to collect samples must be determined on a site specific basis. Due to the wide variety of sampling equipment available, refer to the specific SOPs for sampling techniques which include lists of the equipment/apparatus required for sampling.

6.0 REAGENTS

Reagents may be utilized for preservation of samples and for decontamination of sampling equipment. The preservatives required are specified by the analysis to be performed. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

7.0 PROCEDURE

7.1 Types of Samples

In relation to the media to be sampled, two basic types of samples can be considered: the environmental sample and the hazardous sample.

Environmental samples are those collected from streams, ponds, lakes, wells, and are off-site samples that are not expected to be contaminated with hazardous materials. They usually do not require the special handling procedures typically used for concentrated wastes. However, in certain instances, environmental samples can contain elevated concentrations of pollutants and in such cases would have to be handled as hazardous samples.

Hazardous or concentrated samples are those collected from drums, tanks, lagoons, pits, waste piles, fresh spills, or areas previously identified as contaminated, and require special handling procedures because of their potential toxicity or hazard. These samples can be further subdivided based on their degree of hazard; however, care should be taken when handling and shipping any wastes believed to be concentrated regardless of the degree.

The importance of making the distinction between environmental and hazardous samples is two-fold:

(1) Personnel safety requirements: Any sample thought to contain enough hazardous materials to pose a safety threat should be designated as hazardous and handled in a manner which ensures the safety of both field and laboratory personnel.

(2) Transportation requirements: Hazardous samples must be packaged, labeled, and shipped according to the International Air Transport Association (IATA) Dangerous Goods Regulations or Department of Transportation (DOT) regulations and U.S. EPA guidelines.

7.2 Sample Collection Techniques

In general, two basic types of sample collection techniques are recognized, both of which can be used for either environmental or hazardous samples.

<u>Grab Samples</u>

A grab sample is defined as a discrete aliquot representative of a specific location at a given point in time. The sample is collected all at once at one particular point in the sample medium. The representativeness of such samples is defined by the nature of the materials being sampled. In general, as sources vary over time and distance, the representativeness of grab samples will decrease.

<u>Composite Samples</u>

Composites are nondiscrete samples composed of more than one specific aliquot collected at various sampling locations and/or different points in time. Analysis of this type of sample produces an average value and can in certain instances be used as an alternative to analyzing a number of individual grab samples and calculating an average value. It should be noted, however, that compositing can mask problems by diluting isolated concentrations of some hazardous compounds below detection limits.

Compositing is often used for environmental samples and may be used for hazardous samples under certain conditions. For example, compositing of hazardous waste is often performed after compatibility tests have been completed to determine an average value over a number of different locations (group of drums). This procedure generates data that can be useful by providing an average concentration within a number of units, can serve to keep analytical costs down, and can provide information useful to transporters and waste disposal operations.

For sampling situations involving hazardous wastes, grab sampling techniques are generally preferred because grab sampling minimizes the amount of time sampling personnel must be in contact with the wastes, reduces risks associated with compositing unknowns, and eliminates chemical changes that might occur due to compositing.

7.3 Types of Sampling Strategies

The number of samples that should be collected and analyzed depends on the objective of the investigation. There are three basic sampling strategies: random, systematic, and judgmental sampling.

Random sampling involves collection of samples in a nonsystematic fashion from the entire site or a specific portion of a site. Systematic sampling involves collection of samples based on a grid or a pattern which has been previously established. When judgmental sampling is performed, samples are collected only from the portion(s) of the site most likely to be contaminated. Often, a combination of these strategies is the best approach depending on the type of the suspected/known contamination, the uniformity and size of the site, the level/type of information desired, etc.

7.4 QA Work Plans (QAWP)

A QAWP is required when it becomes evident that a field investigation is necessary. It should be initiated in conjunction with, or immediately following, notification of the field investigation. This plan should be clear and concise and should detail the following basic components, with regard to sampling activities:

C Objective and purpose of the investigation.
C Basis upon which data will be evaluated.
C Information known about the site including location, type and size of the facility, and length of operations/abandonment.
C Type and volume of contaminated material, contaminants of concern (including concentration), and basis of the information/data.
C Technical approach including media/matrix to be sampled, sampling equipment to be used, sample equipment decontamination (if necessary), sampling design and rationale, and SOPs or description of the procedure to be implemented.
C Project management and reporting, schedule, project organization and responsibilities, manpower and cost projections, and required deliverables.
C QA objectives and protocols including tables summarizing field sampling and QA/QC analysis and objectives.

Note that this list of QAWP components is not all-inclusive and that additional elements may be added or altered depending on the specific requirements of the field investigation. It should also be recognized that although a detailed QAWP is quite important, it may be impractical in some instances. Emergency responses and accidental spills are prime examples of such instances where time might prohibit the development of site-specific QAWPs prior to field activities. In such cases, investigators would have to rely on general guidelines and personal judgment, and the sampling or response plans might simply be a strategy based on preliminary information and finalized on site. In any event, a plan of action should be developed, no matter how concise or informal, to aid investigators in maintaining a logical and consistent order to the implementation of their task.

7.5 Legal Implications

The data derived from sampling activities are often introduced as critical evidence during litigation of a hazardous waste site cleanup. Legal issues in which sampling data are important may include cleanup cost recovery, identification of pollution sources and responsible parties, and technical validation of remedial design methodologies. Because of the potential for involvement in legal actions, strict adherence to technical and administrative SOPs is essential during both the development and implementation of sampling activities.

Technically valid sampling begins with thorough planning and continues through the sample collection and analytical procedures. Administrative requirements involve thorough, accurate documentation of all sampling activities. Documentation requirements include maintenance of a chain of custody, as well as accurate records of field activities and analytical instructions. Failure to observe these procedures fully and consistently may result in data that are questionable, invalid and non-defensible in court, and the consequent loss of enforcement proceedings.

8.0 CALCULATIONS

Refer to the specific SOPs for any calculations which are associated with sampling techniques.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

Refer to the specific SOPs for the type and frequency of QA/QC samples to be analyzed, the acceptance criteria for the QA/QC samples, and any other QA/QC activities which are associated with sampling techniques.

10.0 DATA VALIDATION

Refer to the specific SOPs for data validation activities that are associated with sampling techniques.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety procedures.

SAMPLING EQUIPMENT DECONTAMINATION

SOP#: 2006
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide a description of the methods used for preventing, minimizing, or limiting cross-contamination of samples due to inappropriate or inadequate equipment decontamination and to provide general guidelines for developing decontamination procedures for sampling equipment to be used during hazardous waste operations as per 29 Code of Federal Regulations (CFR) 1910.120. This SOP does not address personnel decontamination.

These are standard (i.e. typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Removing or neutralizing contaminants from equipment minimizes the likelihood of sample cross contamination, reduces or eliminates transfer of contaminants to clean areas, and prevents the mixing of incompatible substances.

Gross contamination can be removed by physical decontamination procedures. These abrasive and non-abrasive methods include the use of brushes, air and wet blasting, and high and low pressure water cleaning.

The first step, a soap and water wash, removes all visible particulate matter and residual oils and grease. This may be preceded by a steam or high pressure water wash to facilitate residuals removal. The second step involves a tap water rinse and a distilled/deionized water rinse to remove the detergent. An acid rinse provides a low pH media for trace metals removal and is included in the decontamination process if metal samples are to be collected. It is followed by another distilled/deionized water rinse. If sample analysis does not include metals, the acid rinse step can be omitted. Next, a high purity solvent rinse is performed for trace organics removal if organics are a concern at the site. Typical solvents used for removal of organic contaminants include acetone, hexane, or water. Acetone is typically chosen because it is an excellent solvent, miscible in water, and not a target analyte on the Priority Pollutant List. If acetone is known to be a contaminant of concern at a given site or if Target Compound List analysis (which includes acetone) is to be performed, another solvent may be substituted. The solvent must be allowed to evaporate completely and then a final distilled/deionized water rinse is performed. This rinse removes any residual traces of the solvent.

The decontamination procedure described above may be summarized as follows:

1. Physical removal
2. Non-phosphate detergent wash
3. Tap water rinse
4. Distilled/deionized water rinse
5. 10% nitric acid rinse
6. Distilled/deionized water rinse
7. Solvent rinse (pesticide grade)
8. Air dry
9. Distilled/deionized water rinse

If a particular contaminant fraction is not present at the site, the nine (9) step decontamination procedure specified above may be modified for site specificity. For example, the nitric acid rinse may be eliminated if metals are not of concern at a site. Similarly, the solvent rinse may be eliminated if organics are not of concern at a site. Modifications to the standard procedure should be documented in the site specific work plan or subsequent report.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest.
More specifically, sample collection and analysis of decontamination waste may be required before beginning proper disposal of decontamination liquids and solids generated at a site. This should be determined prior to initiation of site activities.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

C The use of distilled/deionized water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment provided that it has been verified by laboratory analysis to be analyte free (specifically for the contaminants of concern).

C The use of an untreated potable water supply is not an acceptable substitute for tap water. Tap water may be used from any municipal or industrial water treatment system.

C If acids or solvents are utilized in decontamination they raise health and safety, and waste disposal concerns.

C Damage can be incurred by acid and solvent washing of complex and sophisticated sampling equipment.

5.0 EQUIPMENT/APPARATUS

Decontamination equipment, materials, and supplies are generally selected based on availability. Other considerations include the ease of decontaminating or disposing of the equipment. Most equipment and supplies can be easily procured. For example, soft-bristle scrub brushes or long-handled bottle brushes can be used to remove contaminants. Large galvanized wash tubs, stock tanks, or buckets can hold wash and rinse solutions. Children's wading pools can also be used. Large plastic garbage cans or other similar containers lined with plastic bags can help segregate contaminated equipment. Contaminated liquid can be stored temporarily in metal or plastic cans or drums.

The following standard materials and equipment are recommended for decontamination activities:

5.1 Decontamination Solutions

C Non-phosphate detergent
C Selected solvents (acetone, hexane, nitric acid, etc.)
C Tap water
C Distilled or deionized water

5.2 Decontamination Tools/Supplies

C Long and short handled brushes
C Bottle brushes
C Drop cloth/plastic sheeting
C Paper towels
C Plastic or galvanized tubs or buckets
C Pressurized sprayers (H_2O)
C Solvent sprayers
C Aluminum foil

5.3 Health and Safety Equipment

Appropriate personal protective equipment (i.e., safety glasses or splash shield, appropriate gloves, aprons or coveralls, respirator, emergency eye wash)

5.4 Waste Disposal

C Trash bags
C Trash containers
C 55-gallon drums
C Metal/plastic buckets/containers for storage and disposal of decontamination solutions

6.0 REAGENTS

There are no reagents used in this procedure aside from the actual decontamination solutions. Table 1 (Appendix A) lists solvent rinses which may be required for elimination of particular chemicals. In general, the following solvents are typically utilized for decontamination purposes:

- 10% nitric acid is typically used for inorganic compounds such as metals. An acid rinse may not be required if inorganics are not a contaminant of concern.
- Acetone (pesticide grade)[1]
- Hexane (pesticide grade)[1]
- Methanol[1]

[1] - Only if sample is to be analyzed for organics.

7.0 PROCEDURES

As part of the health and safety plan, a decontamination plan should be developed and reviewed. The decontamination line should be set up before any personnel or equipment enter the areas of potential exposure. The equipment decontamination plan should include:

- The number, location, and layout of decontamination stations.
- Decontamination equipment needed.
- Appropriate decontamination methods.
- Methods for disposal of contaminated clothing, equipment, and solutions.
- Procedures can be established to minimize the potential for contamination. This may include: (1) work practices that minimize contact with potential contaminants; (2) using remote sampling techniques; (3) covering monitoring and sampling equipment with plastic, aluminum foil, or other protective material; (4) watering down dusty areas; (5) avoiding laying down equipment in areas of obvious contamination; and (6) use of disposable sampling equipment.

7.1 Decontamination Methods

All samples and equipment leaving the contaminated area of a site must be decontaminated to remove any contamination that may have adhered to equipment. Various decontamination methods will remove contaminants by: (1) flushing or other physical action, or (2) chemical complexing to inactivate contaminants by neutralization, chemical reaction, disinfection, or sterilization.

Physical decontamination techniques can be grouped into two categories: abrasive methods and non-abrasive methods, as follows:

7.1.1 Abrasive Cleaning Methods

Abrasive cleaning methods work by rubbing and wearing away the top layer of the surface containing the contaminant. The mechanical abrasive cleaning methods are most commonly used at hazardous waste sites. The following abrasive methods are available:

<u>Mechanical</u>

Mechanical methods of decontamination include using metal or nylon brushes. The amount and type of contaminants removed will vary with the hardness of bristles, length of time brushed, degree of brush contact, degree of contamination, nature of the surface being cleaned, and degree of contaminant adherence to the surface.

<u>Air Blasting</u>

Air blasting equipment uses compressed air to force abrasive material through a nozzle at high velocities. The distance between nozzle and surface cleaned, air pressure, time of application, and angle at which the abrasive strikes the surface will dictate cleaning efficiency. Disadvantages of this method are the inability to control the amount of material removed and the large amount of waste generated.

<u>Wet Blasting</u>

Wet blast cleaning involves use of a suspended fine abrasive. The abrasive/water mixture is delivered by compressed air to the contaminated area. By using a very fine abrasive, the amount of materials removed can be carefully controlled.

7.1.2 Non-Abrasive Cleaning Methods

Non-abrasive cleaning methods work by forcing the contaminant off a surface with pressure. In general, the equipment surface is not removed using non-abrasive methods.

Low-Pressure Water

This method consists of a container which is filled with water. The user pumps air out of the container to create a vacuum. A slender nozzle and hose allow the user to spray in hard-to-reach places.

High-Pressure Water

This method consists of a high-pressure pump, an operator controlled directional nozzle, and a high-pressure hose. Operating pressure usually ranges from 340 to 680 atmospheres (atm) and flow rates usually range from 20 to 140 liters per minute.

Ultra-High-Pressure Water

This system produces a water jet that is pressured from 1,000 to 4,000 atmospheres. This ultra-high-pressure spray can remove tightly-adhered surface films. The water velocity ranges from 500 meters/second (m/s) (1,000 atm) to 900 m/s (4,000 atm). Additives can be used to enhance the cleaning action.

Rinsing

Contaminants are removed by rinsing through dilution, physical attraction, and solubilization.

Damp Cloth Removal

In some instances, due to sensitive, non-waterproof equipment or due to the unlikelihood of equipment being contaminated, it is not necessary to conduct an extensive decontamination procedure. For example, air sampling pumps hooked on a fence, placed on a drum, or wrapped in plastic bags are not likely to become heavily contaminated. A damp cloth should be used to wipe off contaminants which may have adhered to equipment through airborne contaminants or from surfaces upon which the equipment was set.

Disinfection/Sterilization

Disinfectants are a practical means of inactivating infectious agents. Unfortunately, standard sterilization methods are impractical for large equipment. This method of decontamination is typically performed off-site.

7.2 Field Sampling Equipment Decontamination Procedures

The decontamination line is setup so that the first station is used to clean the most contaminated item. It progresses to the last station where the least contaminated item is cleaned. The spread of contaminants is further reduced by separating each decontamination station by a minimum of three (3) feet. Ideally, the contamination should decrease as the equipment progresses from one station to another farther along in the line.

A site is typically divided up into the following boundaries: Hot Zone or Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), and the Support or Safe Zone (SZ). The decontamination line should be setup in the Contamination Reduction Corridor (CRC) which is in the CRZ. Figure 1 (Appendix B) shows a typical contaminant reduction zone layout. The CRC controls access into and out of the exclusion zone and confines decontamination activities to a limited area. The CRC boundaries should be conspicuously marked. The far end is the hotline, the boundary between the exclusion zone and the contamination reduction zone. The size of the decontamination corridor depends on the number of stations in the decontamination process, overall dimensions of the work zones, and amount of space available at the site. Whenever possible, it should be a straight line.

Anyone in the CRC should be wearing the level of protection designated for the decontamination crew. Another corridor may be required for the entry and exit of heavy equipment. Sampling and monitoring equipment and sampling supplies are all maintained outside of the CRC. Personnel don their equipment away from the CRC and enter the exclusion zone through a separate access control point at the hotline. One person (or more) dedicated to decontaminating equipment is recommended.

7.2.1 Decontamination Setup

Starting with the most contaminated station, the decontamination setup should be as follows:

Station 1: Segregate Equipment Drop

Place plastic sheeting on the ground (Figure 2, Appendix B). Size will depend on amount of equipment to be decontaminated. Provide containers lined with plastic if equipment is to be segregated. Segregation may be required if sensitive equipment or mildly contaminated equipment is used at the same time as equipment which is likely to be heavily contaminated.

Station 2: Physical Removal With A High-Pressure Washer (Optional)

As indicated in 7.1.2, a high-pressure wash may be required for compounds which are difficult to remove by washing with brushes. The elevated temperature of the water from the high-pressure washers is excellent at removing greasy/oily compounds. High pressure washers require water and electricity.

A decontamination pad may be required for the high-pressure wash area. An example of a wash pad may consist of an approximately 1 1/2 foot-deep basin lined with plastic sheeting and sloped to a sump at one corner. A layer of sand can be placed over the plastic and the basin is filled with gravel or shell. The sump is also lined with visqueen and a barrel is placed in the hole to prevent collapse. A sump pump is used to remove the water from the sump for transfer into a drum.

Typically heavy machinery is decontaminated at the end of the day unless site sampling requires that the machinery be decontaminated frequently. A separate decontamination pad may be required for heavy equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Prior to setting up Station 3, place plastic sheeting on the ground to cover areas under Station 3 through Station 10.
Fill a wash basin, a large bucket, or child's swimming pool with non-phosphate detergent and tap water. Several bottle and bristle brushes to physically remove contamination should be dedicated to this station . Approximately 10 - 50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 4: Water Basin

Fill a wash basin, a large bucket, or child's swimming pool with tap water. Several bottle and bristle brushes should be dedicated to this station. Approximately 10-50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 5: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to contain the water during the rinsing process. Approximately 10-20 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 6: Nitric Acid Sprayers

Fill a spray bottle with 10% nitric acid. An acid rinse may not be required if inorganics are not a contaminant of concern. The amount of acid will depend on the amount of equipment to be decontaminated. Provide a 5-gallon bucket or basin to collect acid during the rinsing process.

Station 7: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 8: Organic Solvent Sprayers

Fill a spray bottle with an organic solvent. After each solvent rinse, the equipment should be rinsed with distilled/deionized water and air dried. Amount of solvent will depend on the amount of equipment to decontaminate. Provide a 5-gallon bucket or basin to collect the solvent during the rinsing process.

Solvent rinses may not be required unless organics are a contaminant of concern, and may be eliminated from the station sequence.

Station 9: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 10: Clean Equipment Drop

Lay a clean piece of plastic sheeting over the bottom plastic layer. This will allow easy removal of the plastic in the event that it becomes dirty. Provide aluminum foil, plastic, or other protective material to wrap clean equipment.

7.2.2 Decontamination Procedures

Station 1: Segregate Equipment Drop

Deposit equipment used on-site (i.e., tools, sampling devices and containers, monitoring instruments radios, clipboards, etc.) on the plastic drop cloth/sheet or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross contamination. Loose leaf sampling data sheets or maps can be placed in plastic zip lock bags if contamination is evident.

Station 2: Physical Removal With A High-Pressure Washer (Optional)

Use high pressure wash on grossly contaminated equipment. Do not use high- pressure wash on sensitive or non-waterproof equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Scrub equipment with soap and water using bottle and bristle brushes. Only sensitive equipment (i.e., radios, air monitoring and sampling equipment) which is waterproof should be washed. Equipment which is not waterproof should have plastic bags removed and wiped down with a damp cloth. Acids and organic rinses may also ruin sensitive equipment. Consult the manufacturers for recommended decontamination solutions.

Station 4: Equipment Rinse

Wash soap off of equipment with water by immersing the equipment in the water while brushing. Repeat as many times as necessary.

Station 5: Low-Pressure Rinse

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 6: Nitric Acid Sprayers (required only if metals are a contaminant of concern)

Using a spray bottle rinse sampling equipment with nitric acid. Begin spraying (inside and outside) at one end of the equipment allowing the acid to drip to the other end into a 5-gallon bucket. A rinsate blank may be required at this station. Refer to Section 9.

Station 7: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 8: Organic Solvent Sprayers

Rinse sampling equipment with a solvent. Begin spraying (inside and outside) at one end of the equipment allowing the solvent to drip to the other end into a 5-gallon bucket. Allow the solvent to evaporate from the equipment before going to the next station. A QC rinsate sample may be required at this station.

Station 9: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure washer.

Station 10 : Clean Equipment Drop

Lay clean equipment on plastic sheeting. Once air dried, wrap sampling equipment with aluminum foil, plastic, or other protective material.

7.2.3 Post Decontamination Procedures

1. Collect high-pressure pad and heavy equipment decontamination area liquid and waste and store in appropriate drum or container. A sump pump can aid in the collection process. Refer to the Department of Transportation (DOT) requirements for appropriate containers based on the contaminant of concern.

2. Collect high-pressure pad and heavy equipment decontamination area solid waste and store in appropriate drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

3. Empty soap and water liquid wastes from basins and buckets and store in appropriate

drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

4. Empty acid rinse waste and place in appropriate container or neutralize with a base and place in appropriate drum. pH paper or an equivalent pH test is required for neutralization. Consult DOT requirements for appropriate drum for acid rinse waste.

5. Empty solvent rinse sprayer and solvent waste into an appropriate container. Consult DOT requirements for appropriate drum for solvent rinse waste.

6. Using low-pressure sprayers, rinse basins, and brushes. Place liquid generated from this process into the wash water rinse container.

7. Empty low-pressure sprayer water onto the ground.

8. Place all solid waste materials generated from the decontamination area (i.e., gloves and plastic sheeting, etc.) in an approved DOT drum. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

9. Write appropriate labels for waste and make arrangements for disposal. Consult DOT regulations for the appropriate label for each drum generated from the decontamination process.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITYASSURANCE/ QUALITY CONTROL

A rinsate blank is one specific type of quality control sample associated with the field decontamination process. This sample will provide information on the effectiveness of the decontamination process employed in the field.

Rinsate blanks are samples obtained by running analyte free water over decontaminated sampling equipment to test for residual contamination. The blank water is collected in sample containers for handling, shipment, and analysis. These samples are treated identical to samples collected that day. A rinsate blank is used to assess cross contamination brought about by improper decontamination procedures. Where dedicated sampling equipment is not utilized, collect one rinsate blank per day per type of sampling device samples to meet QA2 and QA3 objectives.

If sampling equipment requires the use of plastic tubing it should be disposed of as contaminated and replaced with clean tubing before additional sampling occurs.

10.0 DATA VALIDATION

Results of quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results in accordance with the project's data quality objectives.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow OSHA, U.S. EPA, corporate, and other applicable health and safety procedures.

Decontamination can pose hazards under certain circumstances. Hazardous substances may be incompatible with decontamination materials. For example, the decontamination solution may react with contaminants to produce heat, explosion, or toxic products. Also, vapors from decontamination solutions may pose a direct health hazard to workers by inhalation, contact, fire, or explosion.

The decontamination solutions must be determined to be acceptable before use. Decontamination materials may degrade protective clothing or equipment; some solvents can permeate protective clothing. If decontamination materials do pose a health hazard, measures should be taken to protect personnel or substitutions should be made to eliminate the hazard. The choice of respiratory protection based on contaminants of concern from the site may not be appropriate for solvents used in the decontamination process.

Safety considerations should be addressed when using abrasive and non-abrasive decontamination equipment. Maximum air pressure produced by abrasive equipment could cause physical injury. Displaced material requires control mechanisms.

Material generated from decontamination activities requires proper handling, storage, and disposal. Personal Protective Equipment may be required for these activities.

Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard (i.e., acetone, alcohol, and trisodiumphosphate).

In some jurisdictions, phosphate containing detergents (i.e., TSP) are banned.

12.0 REFERENCES

Field Sampling Procedures Manual, New Jersey Department of Environmental Protection, February, 1988.

A Compendium of Superfund Field Operations Methods, EPA 540/p-87/001.

Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, USEPA Region IV, April 1, 1986.

Guidelines for the Selection of Chemical Protective Clothing, Volume 1, Third Edition, American Conference of Governmental Industrial Hygienists, Inc., February, 1987.

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, October, 1985.

APPENDIX A

Table

Table 1. Soluble Contaminants and Recommended Solvent Rinse

TABLE 1
Soluble Contaminants and Recommended Solvent Rinse

SOLVENT[1]	EXAMPLES OF SOLVENTS	SOLUBLE CONTAMINANTS
Water	Deionized water Tap water	Low-chain hydrocarbons Inorganic compounds Salts Some organic acids and other polar compounds
Dilute Acids	Nitric acid Acetic acid Boric acid	Basic (caustic) compounds (e.g., amines and hydrazines)
Dilute Bases	Sodium bicarbonate (e.g., soap detergent)	Acidic compounds Phenol Thiols Some nitro and sulfonic compounds
Organic Solvents [2]	Alcohols Ethers Ketones Aromatics Straight chain alkalines (e.g., hexane) Common petroleum products (e.g., fuel, oil, kerosene)	Nonpolar compounds (e.g., some organic compounds)
Organic Solvent[2]	Hexane	PCBs

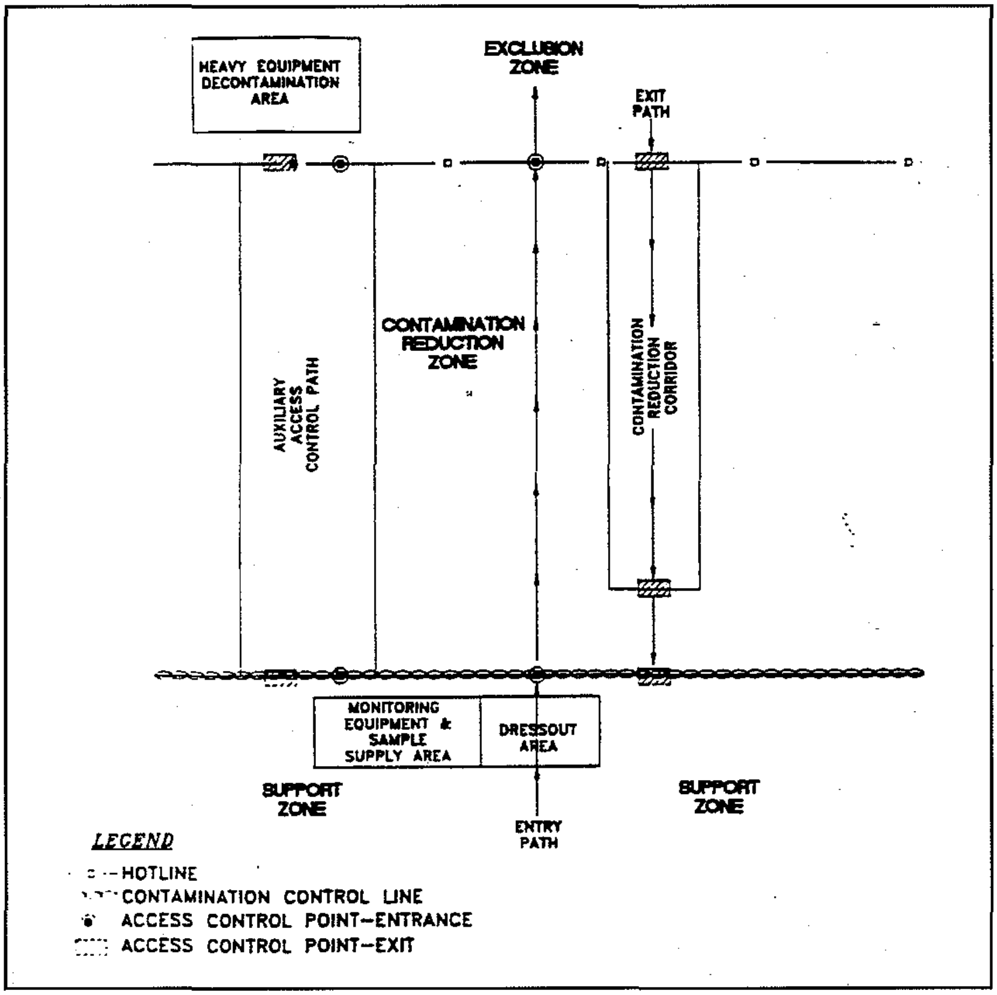
(1) - Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard

(2) - WARNING: Some organic solvents can permeate and/or degrade the protective clothing

APPENDIX B

Figures

Figure 1. Contamination Reduction Zone Layout



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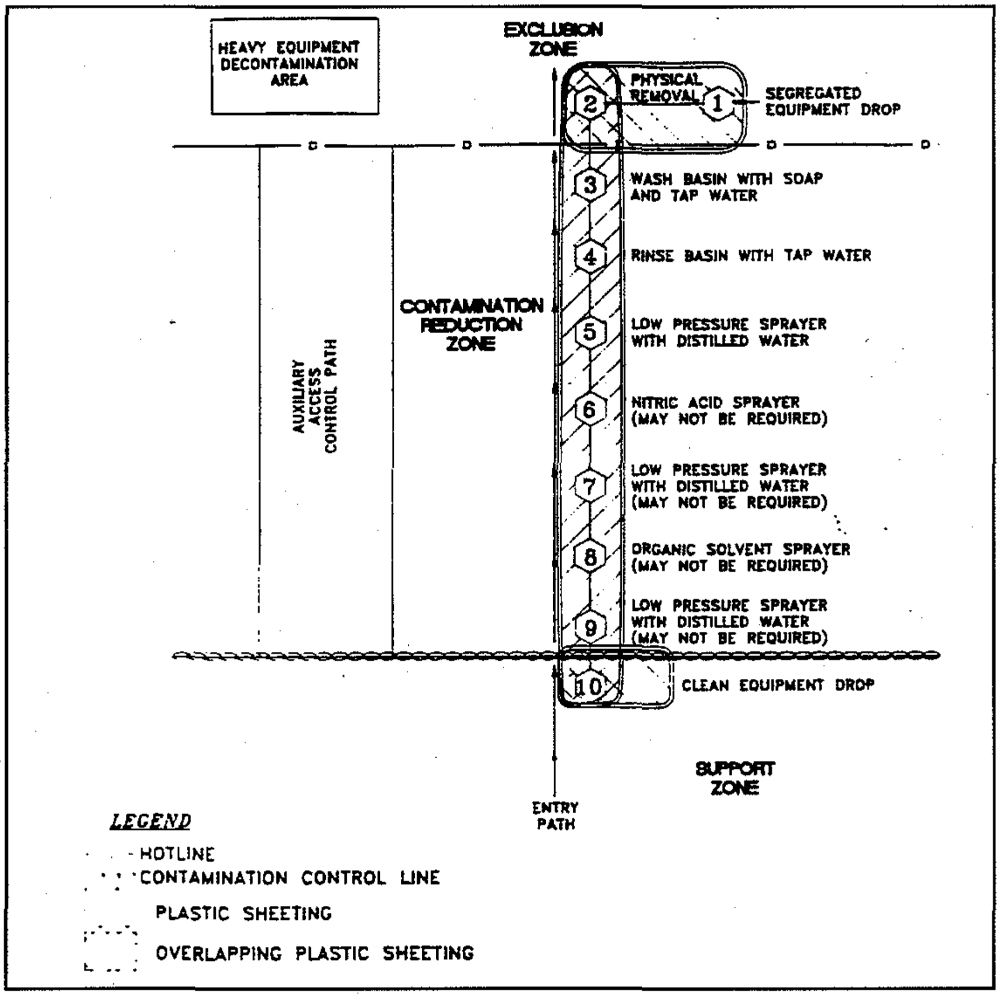
APPENDIX B (Cont'd.)

Figures

Figure 2. Decontamination Layout



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SOIL SAMPLING

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems associated with soil sampling. These include cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT/APPARATUS

Soil sampling equipment includes the following:

- Sampling plan
- Maps/plot plan
- Safety equipment, as specified in the Health and Safety Plan
- Survey equipment
- Tape measure
- Survey stakes or flags
- Camera and film
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- Appropriate size sample containers
- Ziplock plastic bags
- Logbook
- Labels
- Chain of Custody records and seals
- Field data sheets
- Cooler(s)
- Ice
- Vermiculite
- Decontamination supplies/equipment
- Canvas or plastic sheet
- Spade or shovel

- C Spatula
- C Scoop
- C Plastic or stainless steel spoons
- C Trowel
- C Continuous flight (screw) auger
- C Bucket auger
- C Post hole auger
- C Extension rods
- C T-handle
- C Sampling trier
- C Thin wall tube sampler
- C Split spoons
- C Vehimeyer soil sampler outfit
  - Tubes
  - Points
  - Drive head
  - Drop hammer
  - Puller jack and grip
- C Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in the Sampling Equipment Decontamination SOP and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or pre-clean equipment, and ensure that it is in working order.

4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner prior to soil sampling.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material can be removed to the required depth with this equipment, then a stainless steel or plastic scoop can be used to collect the sample.

This method can be used in most soil types but is limited to sampling near surface areas. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A stainless steel scoop, lab spoon, or plastic spoon will suffice in most other applications. The use of a flat, pointed mason trowel to cut a block of the desired soil can be helpful when undisturbed profiles are required. Care should be exercised to avoid use of devices plated with chrome or other materials. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or

other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery since they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory for use when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of three feet.

The following procedure will be used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from boring. When sampling directly from the auger, collect the sample after the auger is removed from the boring and proceed to Step 10.

5. Remove auger tip from drill rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube samplerinto soil. Care should be taken to avoid scraping the borehole sides. Avoid hammering the drill rods to facilitate coring as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the

caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable State regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling at Depth with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure will be used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

3. Slowly withdraw the trier, making sure that the slot is facing upward.

4. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

The procedure for split spoon sampling describes the collection and extraction of undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should be performed in accordance with ASTM D 1586-67 (reapproved 1974).

The following procedures will be used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.

2. Place the sampler in a perpendicular position on the sample material.

3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.

4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.

5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler

is typically available in 2 and 3 1/2 inch diameters. However, in order to obtain the required sample volume, use of a larger barrel may be required.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

These relatively large excavations are used to remove sections of soil, when detailed examination of soil characteristics (horizontal, structure, color, etc.) are required. It is the least cost effective sampling method due to the relatively high cost of backhoe operation.

The following procedures will be used for collecting soil samples from test pit/trench excavations:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of utility lines, subsurface pipes and poles (subsurface as well as above surface).

2. Using the backhoe, a trench is dug to approximately three feet in width and approximately one foot below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

3. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.

4. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.

5. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

6. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OHSA and corporate health and safety procedures.

12.0 REFERENCES

Mason, B.J., Preparation of Soil Sampling Protocol: Technique and Strategies. 1983 EPA-600/4-83-020.

Barth, D.S. and B.J. Mason, Soil Sampling Quality Assurance User's Guide. 1984 EPA-600/4-84-043.

U.S. EPA. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. 1984 EPA-600/4-84-076.

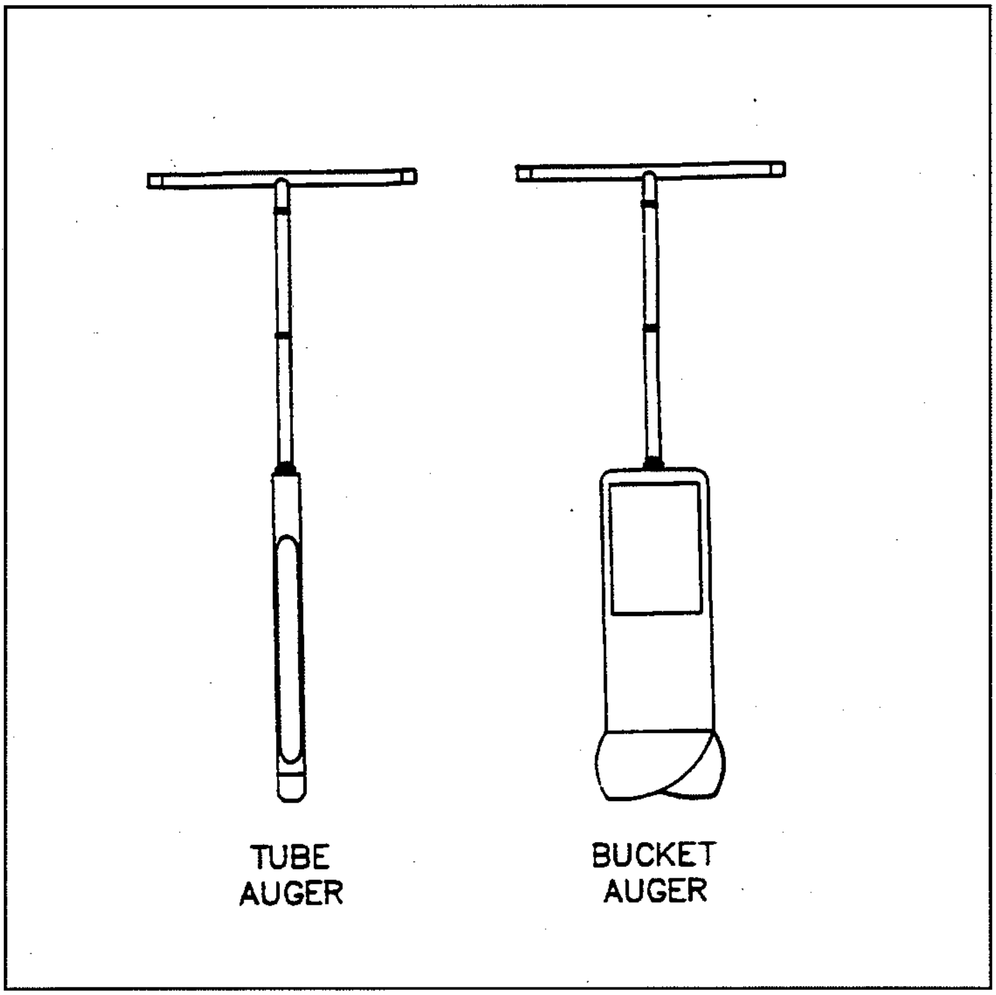
de Vera, E.R., B.P. Simmons, R.D. Stephen, and D.L. Storm. Samplers and Sampling Procedures for Hazardous Waste Streams. 1980 EPA-600/2-80-018.

ASTM D 1586-67 (reapproved 1974), ASTM Committee on Standards, Philadelphia, PA.

APPENDIX A

Figures

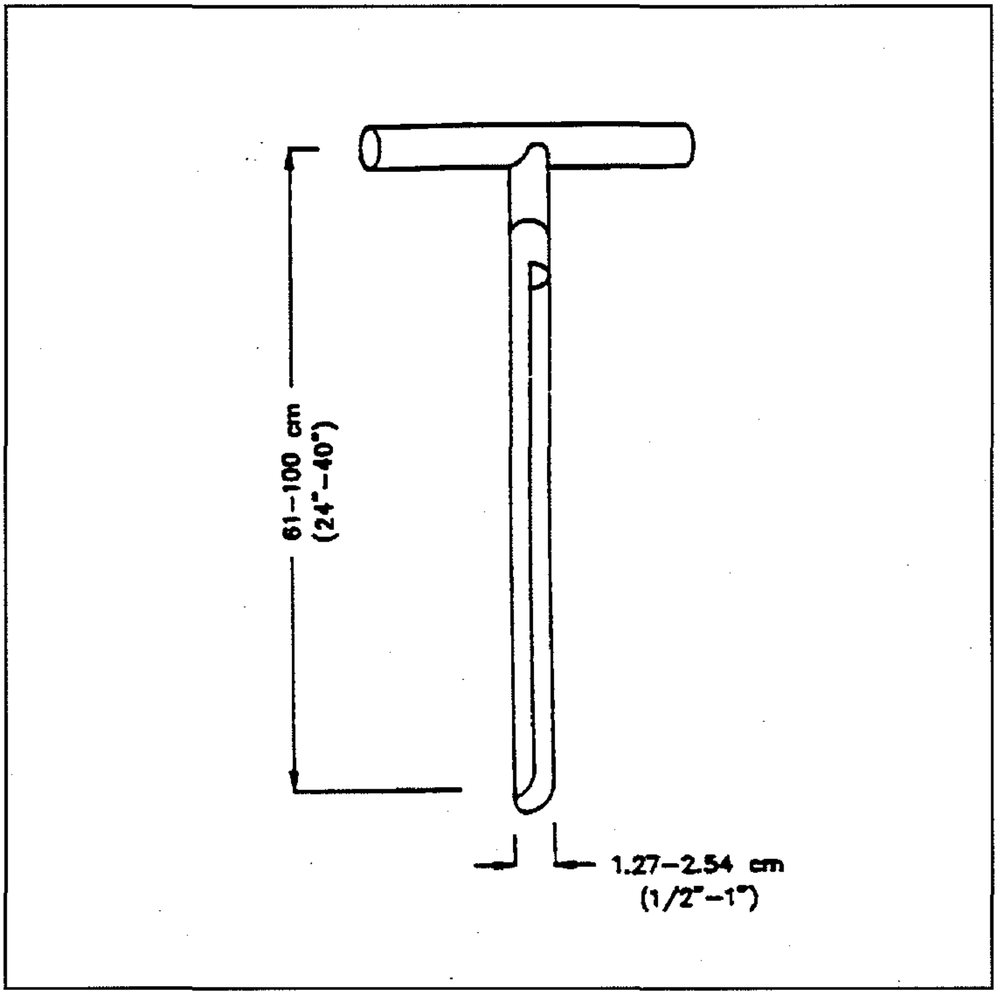
FIGURE 1. Sampling Augers



APPENDIX A (Cont'd)

Figures

FIGURE 2. Sampling Trier



WESTON SOLUTIONS

Weston Solutions, Inc.
Suite 201
1090 King Georges Post Road
Edison, New Jersey 08837-3703
732-585-4400 • Fax 732-225-7037
www.westonsolutions.com

The Trusted Integrator for Sustainable Solutions

REMOVAL SUPPORT TEAM 2
EPA CONTRACT EP-W-06-072

January 30, 2013

Mr. Terry Kish, On-Scene Coordinator
U.S. Environmental Protection Agency
Removal Action Branch
2890 Woodbridge Avenue
Edison, New Jersey 08837

EPA CONTRACT NO: EP-W-06-072
TDD NO: TO-0027-0122
DOCUMENT CONTROL NO: RST 2-02-F-2281
SUBJECT: FINAL REMOVAL ASSESSMENT SAMPLING TRIP REPORT 18 MILE CREEK SITE, 198 - 300 MILL STREET, LOCKPORT, NIAGARA COUNTY, NEW YORK

Dear Mr. Kish,

Enclosed please find the Final Removal Assessment Sampling Trip Report for the asbestos inspection and bulk sampling event conducted on November 15 and 16, 2012 at the 18 Mile Creek Site located at 198-300 Mill Street in Lockport, Niagara County, New York. The final report addresses your comments received on January 23, 2013.

If you have any questions or comments, please do not hesitate to contact me at (732) 585-4419.

Sincerely,

WESTON SOLUTIONS, INC.

Michael Garibaldi

Michael Garibaldi
RST 2 Site Project Manager

Enclosure

cc: TDD File No.: TO-0027-0122

FINAL REMOVAL ASSESSMENT SAMPLING TRIP REPORT

SITE NAME:	18 Mile Creek Site DC No.: RST2-02-F-2281 TDD No.: TO-0027-0122
SAMPLING DATES:	November 15 and 16, 2012
EPA ID NO.:	NYN000206456
1. Site Location:	198-300 Mill Street, Lockport, Niagara County, New York (Refer to Attachment A, Figure 1 - Site Location Map)

2. Sample Summary:

On November 15 and 16, 2012, Weston Solutions, Inc., Removal Support Team 2 (RST 2) collected a total of 28 bulk samples from locations at the former Flintkote Building located on the 18 Mile Creek Site (the Site). The 28 bulk samples were submitted to EMSL Analytical, Inc. (EMSL) for asbestos analysis via Polarized Light Microscopy (PLM) by NYS ELAP Method 198.1 for friable asbestos, NYS ELAP Method 198.6 for non-friable asbestos, and asbestos analysis via Transmission Electron Microscopy (TEM) by NYS ELAP Method 198.4. Refer to Attachment B, Table 1 for the Sample Collection Information and Results Summary.

3. Laboratory Receiving Samples:

Sample Matrix	Analyses	Laboratory
Bulk	Asbestos	EMSL Analytical, Inc. 490 Rowley Road Depew, New York 14043

4. Sample Dispatch Data:

On November 16, 2012, RST 2 hand-delivered 28 bulk samples to the EMSL laboratory located in Depew, New York, for asbestos analysis under Chain of Custody Record No.: 2-111612-145002-0001. Refer to Attachment C for a copy of the Chain of Custody Record.

5. On-Site Personnel:

Name	Representing	Duties On-Site
Terry Kish	EPA, Region II	On-Scene Coordinator (OSC)
Michael Garibaldi	RST 2	Site Project Manager, Site Health & Safety, Sample Collection, Sample Management, Site QA/QC
Matthew Joyce	Paradigm Environmental Services, Inc./ Envoy Environmental Consultants, Inc.	Asbestos Inspector, Sample Collection, Site Documentation

6. Site Background and Description:

The Site is an abandoned industrial property approximately six acres in size located in a primarily residential area at 198-300 Mill Street in the City of Lockport, Niagara County, New York. The Site is situated along the eastern bank of 18 Mile Creek and is bordered by commercial property to the north, vacant land to the south, Mill Street to the east, and 18 Mile Creek to the west.

In March 2012, the Site was added to the National Priorities List (NPL). Among many other properties, the NPL listing includes the former Flintkote property. The former Flintkote property includes a badly deteriorated building which used to derive power from the adjacent 18 Mile Creek. Anecdotal information indicates that polychlorinated biphenyl (PCB) containing wastes may have been discharged in such a manner that a significant source of PCBs remains underneath the building. The condition of the building prevents such an assessment, thus the building will be demolished.

7. Removal Assessment Summary:

On November 15 and 16, 2012, RST 2 conducted a Removal Assessment of the Site including a pre-demolition asbestos survey and bulk asbestos sampling of the former Flintkote Building. Prior to the site work, RST 2 prepared and submitted a Site-Specific Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP) to the U.S. Environmental Protection Agency (EPA) On-Scene Coordinator (OSC). RST 2 subcontracted a local environmental firm,# Paradigm Environmental Services, Inc. (Paradigm), to provide a New York State Department of Labor (DOL) certified Asbestos Inspector to conduct a limited asbestos survey at the former Flintkote Building in accordance with the NYS Code Rule 56 and the asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAPS). The Asbestos Inspector was provided by Envoy Environmental Consultants, Inc., a subcontractor for Paradigm.

RST 2 met with the Asbestos Inspector and the EPA OSC at the Site and held a tailgate health and safety and site operations briefing each day prior to commencing the asbestos survey and bulk sampling activities. During the asbestos survey, the Asbestos Inspector identified the Suspect Asbestos-Containing Material (SACM) locations for bulk sampling at the former Flintkote Building. RST 2 collected bulk samples of the SACM throughout the interior and exterior of the former Flintkote Building including pipe insulation, floor, wall and ceiling tile/debris, process waste, boiler jacket, fire brick, ash/residue, flashing, roofing tile, and other suspect materials. All samples were collected by hand using dedicated nitrile gloves and immediately transferred into double plastic bags and labeled for the laboratory asbestos analysis.

RST 2 collected a total of 28 bulk samples of SACM identified by the Asbestos Inspector from the former Flintkote Building. The bulk samples were submitted to an RST 2-procured laboratory for asbestos analysis using a screening data with definitive confirmation analytical objective. Samples that were analyzed for PLM and reported at less than one percent were also analyzed for TEM. The screening data was used to identify and confirm the presence of asbestos at the Site. Following the sampling activities, RST 2 completed sample management using

EPA's Scribe Sample Management software. From this system, sample labels and the chain of custody forms were prepared and printed. Refer to Attachment D for a copy of the validated laboratory data.

Upon completion of the asbestos survey, Paradigm prepared an asbestos survey report detailing the identification, location, and approximate quantities of the SACM found at the Site as well as the condition of the materials including whether they are friable or non-friable. Refer to Attachment E for a copy of the Asbestos Survey Report.

8. Analytical Results Discussion:

Based on the analytical results, elevated percentages of chrysotile asbestos were detected in bulk materials sampled at the Site. Analytical results for asbestos via PLM of the bulk samples were non-detected except for Sample Nos. P001-BULK-007-001 (1.1% chrysotile), P001-BULK-016-001 (10.7% chrysotile), P001-BULK-024-001 (36.4% chrysotile), and P001-BULK-028-001 (9.3% chrysotile). Analytical results of the bulk samples for asbestos via TEM were non-detected except for Sample No. P001-BULK-019-001 (<1.0% Anthophyllite).

For reference purposes of this report, Attachment A contains the Site Location Map (Figure 1); Attachment B contains the Sample Collection Information and Results Summary (Table 1); Attachment C contains the Chain of Custody Record; Attachment D contains the validated laboratory data; Attachment E contains the Asbestos Survey Report; and Attachment F contains the Photo Documentation Log.

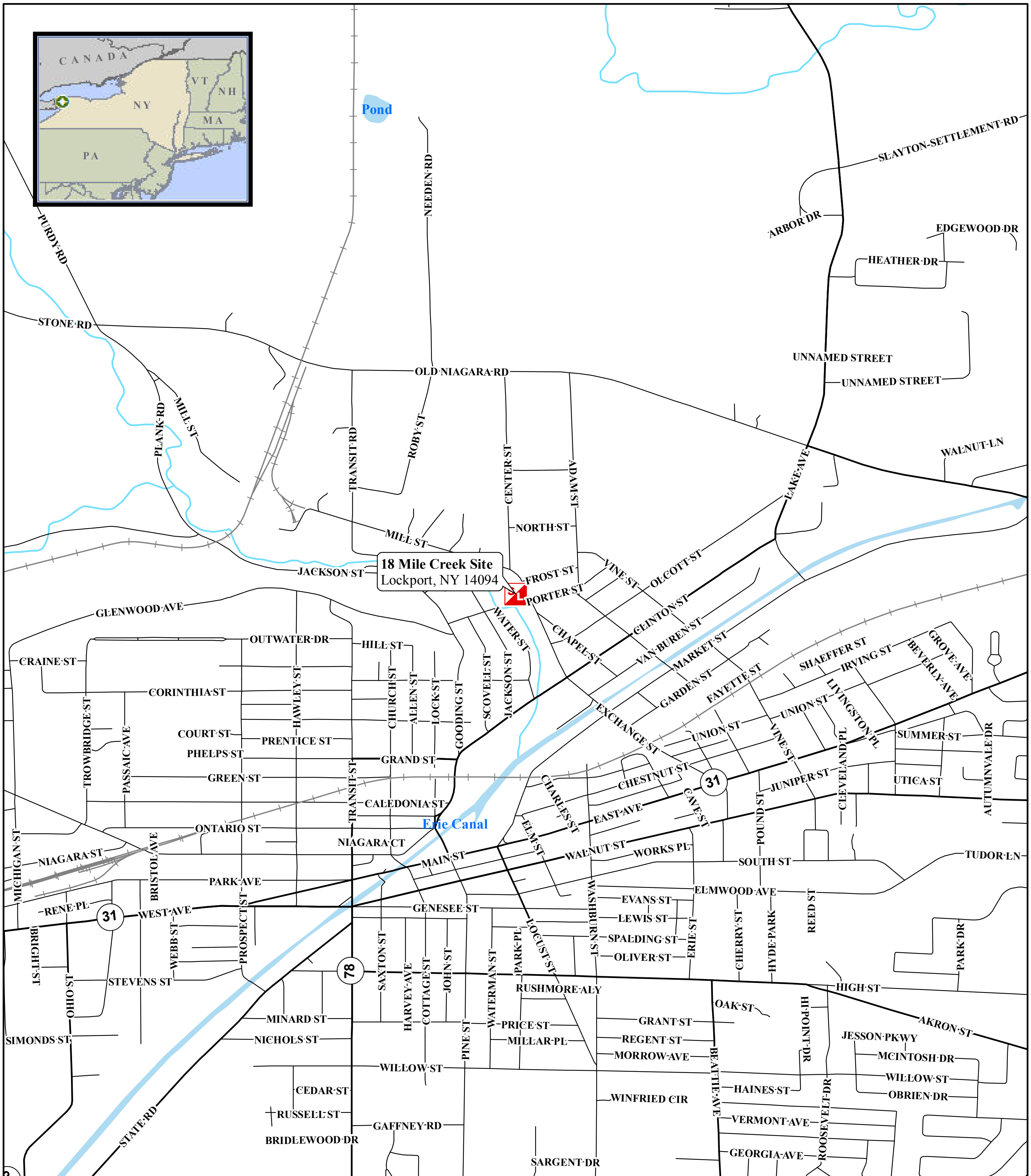
9. Report Prepared by: Michael Garibaldi Date: 1/29/13
Michael Garibaldi
RST 2 Site Project Manager

Report Reviewed by: Timothy Benton Date: 1/29/13
Timothy Benton, CHMM
RST 2 Operations Leader

R2-0014894

ATTACHMENT A

Figure 1: Site Location Map



Legend

Note: Former Flintkote Building/Property Site

Site Location

0 0.1 0.2 0.4 0.6 0.8 Miles

N

WESTON SOLUTIONS

Weston Solutions, Inc.
Northeast Division

In Association With
H & S Environmental, Inc.,
Scientific and Environmental Associates, Inc.
and Avatar Environmental, LLC.

DATE MODIFIED: 1/16/2013

Figure 1:
Site Location Map

18 MILE CREEK SITE
LOCKPORT, NEW YORK

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL SUPPORT TEAM 2
CONTRACT # EP-W-06-072

GIS ANALYST:	T. BENTON
EPA OSC:	T. KISH
RST SPM:	M. GARIBALDI
FILENAME:	SITE LOCATION MAP.MXD

R2-0014896

ATTACHMENT B

Table 1: Sample Collection Information and Results Summary

Table 1 - Sample Collection Information and Results Summary
18 Mile Creek Site - Removal Assessment, November 15 - 16, 2012
Lockport, New York

RST 2 Sample ID	Sample Date	Sample Time	Sample Matrix	Sample Description/Location	Analytical Parameter	Result (Asbestos)
P001-BULK-001-001	11/15/2012	0940	SACM	residue from column, Area E basement	Asbestos, PLM	No Asbestos Detected
P001-BULK-002-001	11/15/2012	0948	SACM	residue from column, Area E basement	Asbestos, PLM	No Asbestos Detected
P001-BULK-003-001	11/15/2012	1000	SACM	process waste/lint, Area E basement	Asbestos, PLM	None Detected
P001-BULK-004-001	11/15/2012	1012	SACM	cloth/fabric-overhead, Area E, 1st floor	Asbestos, PLM	None Detected
P001-BULK-005-001	11/15/2012	1025	SACM	debris waste from baghouse, Area E	Asbestos, PLM	None Detected
P001-BULK-006-001	11/15/2012	1033	SACM	concrete chip, roofing panel, Area D	Asbestos, PLM	None Detected
P001-BULK-007-001	11/15/2012	1045	SACM	roofing material, Area D, 1st floor	Asbestos, PLM	**1.1% Chrysotile**
P001-BULK-008-001	11/15/2012	1054	SACM	pipe insulation, Area D basement	Asbestos, PLM	No Asbestos Detected
P001-BULK-009-001	11/15/2012	1107	SACM	pipe insulation, Area C basement	Asbestos, PLM	No Asbestos Detected
P001-BULK-010-001	11/15/2012	1118	SACM	pipe gasket, Area D basement	Asbestos, PLM	No Asbestos Detected
P001-BULK-011-001	11/15/2012	1125	SACM	wall lint, Area D sub-basement	Asbestos, PLM	None Detected
P001-BULK-012-001	11/15/2012	1137	SACM	ash/debris inside boiler, Area F2	Asbestos, PLM	None Detected
P001-BULK-013-001	11/15/2012	1133	SACM	fire brick inside boiler, Area F2	Asbestos, PLM	None Detected
P001-BULK-014-001	11/15/2012	1146	SACM	boiler jacket insulation, Area F2	Asbestos, PLM	None Detected
P001-BULK-015-001	11/15/2012	1151	SACM	boiler jacket insulation, Area F2	Asbestos, PLM	No Asbestos Detected
P001-BULK-016-001	11/15/2012	1202	SACM	roofing material, Area F2, catwalk	Asbestos, PLM	**10.7% Chrysotile**
P001-BULK-017-001	11/15/2012	1210	SACM	plaster, Area F2, catwalk	Asbestos, PLM	None Detected
P001-BULK-018-001	11/15/2012	1236	SACM	fire brick, stack/ Silo exterior	Asbestos, PLM	None Detected
P001-BULK-019-001	11/15/2012	1345	SACM	window glazing, Area A basement	Asbestos, PLM	No Asbestos Detected
P001-BULK-020-001	11/15/2012	1412	SACM	pipe insulation, Area A, ceiling	Asbestos, PLM	No Asbestos Detected
P001-BULK-021-001	11/15/2012	1425	SACM	pipe mastic, Area A basement	Asbestos, PLM	No Asbestos Detected
P001-BULK-022-001	11/15/2012	1438	SACM	anti-vibration cloth, Area C basement	Asbestos, PLM	None Detected
P001-BULK-023-001	11/16/2012	0926	SACM	wall plaster, Area B basement	Asbestos, PLM	None Detected
P001-BULK-024-001	11/16/2012	0954	SACM	pipe insulation, Area C basement	Asbestos, PLM	**36.4% Chrysotile**
P001-BULK-025-001	11/16/2012	1015	SACM	floor tile, Area A, 1st floor	Asbestos, PLM	No Asbestos Detected
P001-BULK-026-001	11/16/2012	1017	SACM	mastic- floor tile, Area A 1st floor	Asbestos, PLM	No Asbestos Detected
P001-BULK-027-001	11/16/2012	1035	SACM	roofing tile, Area E	Asbestos, PLM	No Asbestos Detected
P001-BULK-028-001	11/16/2012	1050	SACM	flashing/roofing, Area D, exterior	Asbestos, PLM	**9.3% Chrysotile**

PLM - Polarized Light Microscopy

Table 1 - Sample Collection Information and Results Summary
18 Mile Creek Site - Removal Assessment, November 15 - 16, 2012
Lockport, New York

RST 2 Sample ID	Sample Date	Sample Time	Sample Matrix	Sample Description/Location	Analytical Parameter	Result (Asbestos)
P001-BULK-001-001	11/15/2012	0940	SACM	residue from column, Area E basement	Asbestos, TEM	No Asbestos Detected
P001-BULK-002-001	11/15/2012	0948	SACM	residue from column, Area E basement	Asbestos, TEM	No Asbestos Detected
P001-BULK-007-001	11/15/2012	1045	SACM	roofing material, Area D, 1st floor	Asbestos, TEM	Not Analyzed
P001-BULK-008-001	11/15/2012	1054	SACM	pipe insulation, Area D basement	Asbestos, TEM	No Asbestos Detected
P001-BULK-009-001	11/15/2012	1107	SACM	pipe insulation, Area C basement	Asbestos, TEM	No Asbestos Detected
P001-BULK-010-001	11/15/2012	1118	SACM	pipe gasket, Area D basement	Asbestos, TEM	No Asbestos Detected
P001-BULK-015-001	11/15/2012	1151	SACM	boiler jacket insulation, Area F2	Asbestos, TEM	No Asbestos Detected
P001-BULK-016-001	11/15/2012	1202	SACM	roofing material, Area F2, catwalk	Asbestos, TEM	Not Analyzed
P001-BULK-019-001	11/15/2012	1345	SACM	window glazing, Area A basement	Asbestos, TEM	**<1% Anthophyllite**
P001-BULK-020-001	11/15/2012	1412	SACM	pipe insulation, Area A, ceiling	Asbestos, TEM	No Asbestos Detected
P001-BULK-021-001	11/15/2012	1425	SACM	pipe mastic, Area A basement	Asbestos, TEM	No Asbestos Detected
P001-BULK-025-001	11/16/2012	1015	SACM	floor tile, Area A, 1st floor	Asbestos, TEM	No Asbestos Detected
P001-BULK-026-001	11/16/2012	1017	SACM	mastic- floor tile, Area A 1st floor	Asbestos, TEM	No Asbestos Detected
P001-BULK-027-001	11/16/2012	1035	SACM	roofing tile, Area E	Asbestos, TEM	No Asbestos Detected
P001-BULK-028-001	11/16/2012	1050	SACM	flashing/roofing, Area D, exterior	Asbestos, TEM	Not Analyzed

TEM - Transmission Electron Microscopy

ATTACHMENT C

Chain of Custody Record

1412056 81

Weston Solutions, Inc.- RST 2
EPA Contract Number: EP-W-06-072
Hand-delivered
Date: 11/16/2012

CHAIN OF CUSTODY RECORD
RFP# 247
Contact Name: Mike Garibaldi
Contact Phone: 908-565-2971

No: 2-111612-145002-0001
Cooler #: 1
Lab: EMSL Analytical, Inc.
Lab Phone: 716-651-0030

Lab #	Sample #	Location	Collected	Sample Time	Sample Type	Collection Method	Numb Cont	Container	Analyses
	P001-BULK-001-001	P001-BULK-001	11/15/2012	09:40	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-002-001	P001-BULK-002	11/15/2012	09:48	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-003-001	P001-BULK-003	11/15/2012	10:00	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-004-001	P001-BULK-004	11/15/2012	10:12	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-005-001	P001-BULK-005	11/15/2012	10:25	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-006-001	P001-BULK-006	11/15/2012	10:33	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-007-001	P001-BULK-007	11/15/2012	10:45	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-008-001	P001-BULK-008	11/15/2012	10:54	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-009-001	P001-BULK-009	11/15/2012	11:07	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-010-001	P001-BULK-010	11/15/2012	11:18	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-011-001	P001-BULK-011	11/15/2012	11:25	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-012-001	P001-BULK-012	11/15/2012	11:37	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-013-001	P001-BULK-013	11/15/2012	11:33	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-014-001	P001-BULK-014	11/15/2012	11:46	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-015-001	P001-BULK-015	11/15/2012	11:51	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-016-001	P001-BULK-016	11/15/2012	12:02	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-017-001	P001-BULK-017	11/15/2012	12:10	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-018-001	P001-BULK-018	11/15/2012	12:36	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-019-001	P001-BULK-019	11/15/2012	13:45	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N

Special Instructions: Analyze samples at 1 week turnaround time for written results.	SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
All Analysis	Michael Garibaldi	11/16/12									
	[signature]	11/16/12			6:05pm						

1205681

14120 5681

Weston Solutions, Inc.- RST 2
EPA Contract Number: EP-W-06-072
Hand-delivered
Date: 11/16/2012

CHAIN OF CUSTODY RECORD
RFP# 247
Contact Name: Mike Garibaldi
Contact Phone: 908-565-2971

No: 2-111612-145002-0001
Cooler #: 1
Lab: EMSL Analytical, Inc.
Lab Phone: 716-651-0030

Lab #	Sample #	Location	Collected	Sample Time	Sample Type	Collection Method	Numb Cont	Container	Analyses
	P001-BULK-020-001	P001-BULK-020	11/15/2012	14:12	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-021-001	P001-BULK-021	11/15/2012	14:25	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-022-001	P001-BULK-022	11/15/2012	14:38	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-023-001	P001-BULK-023	11/16/2012	09:26	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-024-001	P001-BULK-024	11/16/2012	09:54	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-025-001	P001-BULK-025	11/16/2012	10:15	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-026-001	P001-BULK-026	11/16/2012	10:17	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-027-001	P001-BULK-027	11/16/2012	10:35	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-028-001	P001-BULK-028	11/16/2012	10:50	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N

Special Instructions: Analyze samples at 1 week turnaround time for written results.

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
All Analysis	Mike Garibaldi	11/16/12									
	[signature]	11/16/12			6:05pm						

205681

R2-0014902

ATTACHMENT D

Validated Laboratory Data

Weston Solutions, Inc.
Suite 201
1090 King Georges Post Road
Edison, New Jersey 08837-3703
732-585-4400 • Fax 732-225-7037
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REMOVAL SUPPORT TEAM 2
EPA CONTRACT EP-W-06-072

RST 2-02-F-2259

TRANSMITTAL MEMO

To:	Mr. Terry Kish, On-Scene Coordinator Removal Action Branch U.S. EPA, Region II
From:	Smita Sumbaly, Data Reviewer RST 2, Region II
Subject:	18 Mile Creek Site Data Validation Assessment
Date:	January 17, 2013

The purpose of this memo is to transmit the following information:

- Data validation results for the following parameters:

Asbestos PLM	28 Samples
Asbestos TEM	12 Samples

- Matrices and Number of Samples

Asbestos Bulk	28 Samples

- Sampling Dates: November 15 and 16, 2012

The final data assessment narrative and original analytical data package are attached.

cc:	RST 2 SPM:	Michael Garibaldi
	RST 2 SITE FILE TDD #:	TO-0027-0122
	RST 2 ANALYTICAL TDD #:	TO-0027-0124
	TASK#:	6148

U.S. ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

DATE: **January 17, 2013**

TO: **Terry Kish, OSC**
U. S. EPA, Region II

FROM: **Smita Sumbaly**
RST 2 Data Reviewer

SUBJECT: **QA/QC Compliance Review Summary**

As requested quality control and performance measures for the data packages noted have been examined and compared to EPA standards for compliance. Measures for the following general areas were evaluated as applicable:

Data Completeness	Blanks
Spectra Matching Quality	DFTPP and BFB Tuning
Surrogate Spikes	Chromatography
Matrix Spikes/Duplicates	Holding Times
Calibration	Compound ID (HSL, TIC)

Any statistical measures used to support the following conclusions are attached so that the review may be reviewed by others.

Summary of Results

	I Asbestos PLM	II Asbestos TEM
Acceptable as Submitted	X	X
Acceptable with Comments		
Unacceptable, Action Pending		
Unacceptable		

Data Reviewed by: Smita Sumbaly Date: 1/17/2013

Approved By: Date: 1/17/13

Area Code/Phone No.: (732) 585-4410

NARRATIVE

PCS No. 6148

SITE NAME: **18 mile Creek Site**
198-300 Mill Road, Lockport
Niagara County, New York

Laboratory Name: EMSL Analytical, Inc., 490 Rowley Road, Depew, New York

INTRODUCTION:

The laboratory's portion consists of 28 Bulk Presumed Asbestos Containing Materials (PACM) samples, for Asbestos analyses. All samples were collected on November 15 and 16, 2012. The laboratory Order Number is: 141205681.

The laboratory reported No problem(s) with the receipt of these samples.

The laboratory reported No problems with the analyses of PLM or TEM Asbestos.

The evaluator has commented on the criteria specified under each fraction heading. All criteria have been assessed, but no discussion is given where the evaluator has determined that criteria were adequately performed or require no comment. Details relevant to these comments are given on the following forms.

Appropriate Form Is and Chain of Custody have been copied from the original data package and appended to the data assessment narrative for reference.

I. Asbestos:

_Y_ Holding Time
_Y_ Replicate Results
_Y_ Refractive Index Oil Calibration Worksheet
_Y_ Daily PLM Checklist
_Y_ Data Completeness

Comments:

1. Refer to Data Assessment Narrative.

Title: Evaluation of Asbestos Data
Data Assessment Narrative

RFP #: 247/Task#: 6148 **Site: 18 Mile Creek Site**

Contractor: WESTON-RST 2 **Reviewer: SMITA SUMBALY**

Matrix/No. of Samples: Bulk/28

A.2.1 Validation Flags- The following flags have been applied in red by the data validator and must be considered by the data user.

J- This flag indicates the result qualified as estimated.

Red- Line- A red-line drawn through a sample result indicates an unusable value. The red-lined data are known to contain significant errors based on documented information and must not be used by the data user.

Fully Usable Data- The results that do not carry "J" or "red-line" are fully usable.

A.2.2 The data assessment is given below and on the attached sheets.

On November 15 and 16, 2012, U.S. EPA Region II, RST 2 personnel collected 28 bulk samples, from the 18 Mile Creek Site, 198-300 Mill Street, Lockport, Niagara County, New York. On November 16, 2012, all the samples were hand-delivered to EMSL Analytical laboratory, 490 Rowley Road, Depew, New York. The laboratory verified that the samples were received intact and properly custody sealed.

Thirteen friable bulk PACM samples were analyzed by Polarized Light Microscopy (PLM) using the procedures from the PLM NYS ELAP 198.1 Method. Data was reported as percent asbestos. The quantification limit for the method is <1.0%.

Fifteen non-friable bulk PACM samples were analyzed by Polarized Light Microscopy (PLM) using the procedures from the PLM NYS ELAP 198.6 Method. Data was reported as percent asbestos. Out of 15 non-friable samples, 12 samples were reported as <1.0% or Inconclusive, therefore laboratory performed the confirmation analysis by Transmission Electron Microscopy (TEM) using the procedure from TEM NYS ELAP 198.4 Method. The quantification limit for the method is <1.0%.

Title: Evaluation of Asbestos Data
Data Assessment Narrative

A.2.2 Continuation:

Client identification (ID) and laboratory ID numbers are as follows:

Client ID No.	Laboratory ID No.	Matrix	Sampling Date	Analysis
EMSL Order No.: 141205681				
P001-BULK-003-001	141205681-0003	Bulk	11/15/2012	Asbestos PLM
P001-BULK-004-001	141205681-0004	Bulk	11/15/2012	Asbestos PLM
P001-BULK-005-001	141205681-0005	Bulk	11/15/2012	Asbestos PLM
P001-BULK-006-001	141205681-0006	Bulk	11/15/2012	Asbestos PLM
P001-BULK-011-001	141205681-0011	Bulk	11/15/2012	Asbestos PLM
P001-BULK-012-001	141205681-0012	Bulk	11/15/2012	Asbestos PLM
P001-BULK-013-001	141205681-0013	Bulk	11/15/2012	Asbestos PLM
P001-BULK-014-001	141205681-0014	Bulk	11/15/2012	Asbestos PLM
P001-BULK-017-001	141205681-0017	Bulk	11/15/2012	Asbestos PLM
P001-BULK-018-001	141205681-0018	Bulk	11/15/2012	Asbestos PLM
P001-BULK-022-001	141205681-0022	Bulk	11/15/2012	Asbestos PLM
P001-BULK-023-001	141205681-0023	Bulk	11/16/2012	Asbestos PLM
P001-BULK-024-001	141205681-0024	Bulk	11/16/2012	Asbestos PLM
P001-BULK-001-001	141205681-0001	Bulk	11/15/2012	Asbestos PLM/TEM
P001-BULK-002-001	141205681-0002	Bulk	11/15/2012	Asbestos PLM/TEM
P001-BULK-007-001	141205681-0007	Bulk	11/15/2012	Asbestos PLM
P001-BULK-008-001	141205681-0008	Bulk	11/15/2012	Asbestos PLM/TEM
P001-BULK-009-001	141205681-0009	Bulk	11/15/2012	Asbestos PLM/TEM
P001-BULK-010-001	141205681-0010	Bulk	11/15/2012	Asbestos PLM/TEM
P001-BULK-015-001	141205681-0015	Bulk	11/15/2012	Asbestos PLM/TEM
P001-BULK-016-001	141205681-0016	Bulk	11/15/2012	Asbestos PLM
P001-BULK-019-001	141205681-0019	Bulk	11/15/2012	Asbestos PLM/TEM
P001-BULK-020-001	141205681-0020	Bulk	11/15/2012	Asbestos PLM/TEM
P001-BULK-021-001	141205681-0021	Bulk	11/15/2012	Asbestos PLM/TEM
P001-BULK-025-001	141205681-0025	Bulk	11/16/2012	Asbestos PLM/TEM
P001-BULK-026-001	141205681-0026	Bulk	11/16/2012	Asbestos PLM/TEM
P001-BULK-027-001	141205681-0027	Bulk	11/16/2012	Asbestos PLM/TEM
P001-BULK-028-001	141205681-0028	Bulk	11/16/2012	Asbestos PLM

Asbestos PLM analysis of Bulk by NY State ELAP 198.1:

Thirteen friable bulk samples were analyzed by PLM using the procedures from the PLM NYS ELAP 198.1 Method. All PLM data was reported on a percent asbestos basis. The quantification limit of this Method is <1%. All PLM samples were reported as non-detected, except sample No. P001-BULK-024-001 was reported as 36.40% Chrysotile asbestos.

Title: Evaluation of Asbestos Data
Data Assessment Narrative

ASBESTOS – PLM BULK SAMPLE TABULATED RESULTS-198.1

Client Sample ID Number	Laboratory Sample ID Number	Percent Fibrous	Percent Non-Fibrous	Asbestos Percent Type
EMSL Order No.: 141205681				
P001-BULK-003-001	141205681-0003	80.00% Cellulose	20.00% Non-fibrous	None Detected
P001-BULK-004-001	141205681-0004	80.00% Cellulose	20.00% Non-fibrous	None Detected
P001-BULK-005-001	141205681-0005	70.00% Cellulose	30.00% Non-fibrous	None Detected
P001-BULK-006-001	141205681-0006	-	100.00% Non-fibrous	None Detected
P001-BULK-011-001	141205681-0011	60.00% Synthetic	40.00% Non-fibrous	None Detected
P001-BULK-012-001	141205681-0012	-	100.00% Non-fibrous	None Detected
P001-BULK-013-001	141205681-0013	-	100.00% Non-fibrous	None Detected
P001-BULK-014-001	141205681-0014	-	100.00% Non-fibrous	None Detected
P001-BULK-017-001	141205681-0017	-	100.00% Non-fibrous	None Detected
P001-BULK-018-001	141205681-0018	-	100.00% Non-fibrous	None Detected
P001-BULK-022-001	141205681-0022	80.00% Cellulose	20.00% Non-fibrous	None Detected
P001-BULK-023-001	141205681-0023	-	100.00% Non-fibrous	None Detected
P001-BULK-024-001	141205681-0024	-	63.60% Non-fibrous	36.40% Chrysotile

Asbestos PLM analysis of Bulk by NY State ELAP 198.6:

Fifteen non-friable bulk samples were analyzed by PLM using the procedures from the PLM NYS ELAP 198.6 Method. All PLM data was reported on a percent asbestos basis. The quantification limit of this Method is <1%. Out of fifteen samples, twelve samples were reported as Inconclusive: no asbestos detected; and three samples were reported as 1.1% to 10.7% Chrysotile asbestos.

For QC purposes, the laboratory analyzed two intra-analysis, PLM analyst accuracy report/chart, PLM calibration and contamination record, calibration of common RI oil, and all QC results are acceptable.

ASBESTOS – PLM BULK SAMPLE TABULATED RESULTS-198.6

Client Sample ID Number	Laboratory Sample ID Number	Matrix Material	Percent Non-Fibrous	Asbestos Percent Type
EMSL Order No.: 141205681				
P001-BULK-001-001	141205681-0001	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-002-001	141205681-0002	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-007-001	141205681-0007	98.9% Other	None	1.1% Chrysotile 1.1% Total
P001-BULK-008-001	141205681-0008	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-009-001	141205681-0009	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-010-001	141205681-0010	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-015-001	141205681-0015	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-016-001	141205681-0016	89.3% Other	None	10.7% Chrysotile 10.7% Total
P001-BULK-019-001	141205681-0019	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-020-001	141205681-0020	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-021-001	141205681-0021	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-025-001	141205681-0025	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-026-001	141205681-0026	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-027-001	141205681-0027	100% Other	None	Inconclusive: No Asbestos Detected
P001-BULK-028-001	141205681-0028	90.7% Other	None	9.3% Chrysotile 9.3% Total

Method 198.6 "Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative transmission electron microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing." **Samples with inconclusive results must not be interpreted as being non-ACM.**

Asbestos TEM analysis of Bulk by NY State ELAP 198.4:

Out of fifteen non-friable bulk samples, twelve samples were reported as less than 1% asbestos or inconclusive. Laboratory performed the confirmation analysis on twelve samples by TEM using the procedures from the TEM NYS ELAP 198.4 Method. All TEM data was reported on a percent asbestos basis. The quantification limit of this Method is <1%. Out of twelve samples, eleven samples were reported as no asbestos detected and one sample was reported as <1% Anthophyllite.

For QC purposes, the laboratory analyzed a two intra-analysis, TEM calibration, TEM Bulk Analyst accuracy report/chart and all QC results are acceptable.

ASBESTOS – TEM BULK SAMPLE TABULATED RESULTS-198.4

Client Sample ID Number	Laboratory Sample ID Number	Matrix Material	Percent Non-Fibrous	Asbestos Percent Type
EMSL Order No.: 141205681				
P001-BULK-001-001	141205681-0001	100% Other	None	No Asbestos Detected
P001-BULK-002-001	141205681-0002	100% Other	None	No Asbestos Detected
P001-BULK-008-001	141205681-0008	100% Other	None	No Asbestos Detected
P001-BULK-009-001	141205681-0009	100% Other	None	No Asbestos Detected
P001-BULK-010-001	141205681-0010	100% Other	None	No Asbestos Detected
P001-BULK-015-001	141205681-0015	100% Other	None	No Asbestos Detected
P001-BULK-019-001	141205681-0019	100% Other	None	<1% Anthophyllite
P001-BULK-020-001	141205681-0020	100% Other	None	No Asbestos Detected
P001-BULK-021-001	141205681-0021	100% Other	None	No Asbestos Detected
P001-BULK-025-001	141205681-0025	100% Other	None	No Asbestos Detected
P001-BULK-026-001	141205681-0026	100% Other	None	No Asbestos Detected
P001-BULK-027-001	141205681-0027	100% Other	None	No Asbestos Detected

A.2.3 Contract Problem/Non-Compliance:

None

Contractor Reviewer: [signature] Signature: 1/17/13 Date:

Verified by: [signature] Signature: 1/17/13 Date:

TABLE OF CONTENTS

1. PLM Report

2. PLM Narrative

PLM Narrative

PLM Samples were prepped and analyzed via the NYSDOH-ELAP 198.1 method.

Samples were prepped for analysis using scalpel and forceps as well as appropriate RI Oil. Suspect asbestos fibers were identified using dispersion staining and the samples were quantified using visual estimation. NYS Stratified Point Count was performed according to NYSDOH-ELAP 198.1.

There were no problems encountered in the course of this project and no corrective actions taken.

Type of scopes used are Nikon Optiphot and Leica DM EP

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone/Fax: (716) 651-0030 / (716) 651-0394
http://www.emsl.com buffalolab@emsl.com

EMSL Order:	141205681
CustomerID:	RFWE53
CustomerPO:	
ProjectID:	RFP 247

Attn: **Mike Garibaldi**
Weston Solutions (King Georges Post)
1090 King Georges Post Road
Suite 201
Edison, NJ 08837

Phone:	(732) 585-4400
Fax:	
Received:	11/16/12 6:05 PM
Analysis Date:	11/23/2012
Collected:	11/15/2012

Project: **RFP No. 247 / Side ID #ZZ / TDD# TO-0027-00xx / RST Contract #EP-W-06-072 (No. 2-111612-145002-0001)**

Test Report: Asbestos Analysis of Bulk Materials by PLM via the NY State ELAP 198.1 Method

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
P001-BULK-003-001 *141205681-0003*	P001-BULK-003	Brown Fibrous Homogeneous	80.00% Cellulose	20.00% Non-fibrous (other)	**None Detected**
P001-BULK-004-001 *141205681-0004*	P001-BULK-004	Brown Fibrous Homogeneous	80.00% Cellulose	20.00% Non-fibrous (other)	**None Detected**
P001-BULK-005-001 *141205681-0005*	P001-BULK-005	Gray Fibrous Homogeneous	70.00% Cellulose	30.00% Non-fibrous (other)	**None Detected**
P001-BULK-006-001 *141205681-0006*	P001-BULK-006	Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
P001-BULK-011-001 *141205681-0011*	P001-BULK-011	Black Fibrous Homogeneous	60.00% Synthetic	40.00% Non-fibrous (other)	**None Detected**
P001-BULK-012-001 *141205681-0012*	P001-BULK-012	Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)
Taron Williams (13)

Rhonda McGee
Rhonda McGee, Laboratory Manager
or other approved signatory

Initial report from 11/23/2012 10:29:40

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone/Fax: (716) 651-0030 / (716) 651-0394
http://www.emsl.com buffalolab@emsl.com

EMSL Order:	141205681
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Project: **RFP No. 247 / Side ID #ZZ / TDD# TO-0027-00xx / RST Contract #EP-W-06-072 (No. 2-111612-145002-0001)**

Test Report: Asbestos Analysis of Bulk Materials by PLM via the NY State ELAP 198.1 Method

			Non-Asbestos		Asbestos
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
P001-BULK-013-001 *141205681-0013*	P001-BULK-013	Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
P001-BULK-014-001 *141205681-0014*	P001-BULK-014	Yellow Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
P001-BULK-017-001 *141205681-0017*	P001-BULK-017	Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
P001-BULK-018-001 *141205681-0018*	P001-BULK-018	Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
P001-BULK-022-001 *141205681-0022*	P001-BULK-022	Black Fibrous Homogeneous	80.00% Cellulose	20.00% Non-fibrous (other)	**None Detected**
P001-BULK-023-001 *141205681-0023*	P001-BULK-023	Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)
Taron Williams (13)

Rhonda McGee
Rhonda McGee, Laboratory Manager
or other approved signatory

Initial report from 11/23/2012 10:29:40

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone/Fax: (716) 651-0030 / (716) 651-0394
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Project: RFP No. 247 / Side ID #ZZ / TDD# TO-0027-00xx / RST Contract #EP-W-06-072 (No. 2-111612-145002-0001)

Test Report: Asbestos Analysis of Bulk Materials by PLM via the NY State ELAP 198.1 Method

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
P001-BULK-024-001 *141205681-0024*	P001-BULK-024	White Fibrous Homogeneous		63.60% Non-fibrous (other)	**36.40% Chrysotile**

Analyst(s)
Taron Williams (13)

Rhonda McGee
Rhonda McGee, Laboratory Manager
or other approved signatory

Initial report from 11/23/2012 10:29:40

7. PLM NOB Narrative

PLM NOB Narrative

PLM NOB samples were prepped and analyzed via the NYSDOH-ELAP 198.6 method.

Organic reduction is performed on the sample by ashing (using a muffle furnace) followed by acid digestion to remove the carbonate mineral. Mass determinations are recorded after each step – determining the % loss for each type of matrix materials. The reduced sample is analyzed for asbestos following PLM analysis.

There were no problems encountered in the course of this project and no corrective actions taken.

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone/Fax: (716) 651-0030 / (716) 651-0394
http://www.emsl.com buffalolab@emsl.com

EMSL Order: 141205681
CustomerID: RFWE53
CustomerPO:
ProjectID: RFP 247

Attn: **Mike Garibaldi**
Weston Solutions (King Georges Post)
1090 King Georges Post Road
Suite 201
Edison, NJ 08837

Phone: (732) 585-4400
Fax:
Received: 11/16/12 6:05 PM
Analysis Date: 11/23/2012
Collected: 11/15/2012

Project: RFP No. 247 / Side ID #ZZ / TDD# TO-0027-00xx / RST Contract #EP-W-06-072 (No. 2-111612-145002-0001)

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by PLM via the NY State ELAP 198.6 Method

SAMPLE ID	DESCRIPTION	APPEARANCE	MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES
P001-BULK-001-001 *141205681-0001*	P001-BULK-001	Black Fibrous Heterogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-002-001 *141205681-0002*	P001-BULK-002	Black Fibrous Heterogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-007-001 *141205681-0007*	P001-BULK-007	Black Fibrous Heterogeneous	98.9% Other	None	**1.1% Chrysotile** **1.1% Total**
P001-BULK-008-001 *141205681-0008*	P001-BULK-008	Black Fibrous Homogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-009-001 *141205681-0009*	P001-BULK-009	Black Fibrous Homogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-010-001 *141205681-0010*	P001-BULK-010	Rust Non-Fibrous Homogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-015-001 *141205681-0015*	P001-BULK-015	Tan Non-Fibrous Homogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-016-001 *141205681-0016*	P001-BULK-016	Black Fibrous Heterogeneous	89.3% Other	None	**10.7% Chrysotile** **10.7% Total**

Analyst(s)
Rachel Giese (1)
Taron Williams (14)

Rhonda McGee
Rhonda McGee, Laboratory Manager
or other approved signatory

*Polarized Light Microscopy (PLM) is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative Transmission Electron Microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing. The test results contained within this report meet the requirements of NELAC unless otherwise noted. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. The above test report relates only to the items tested. EMSL bears no responsibility for sample collection activities or analytical method limitations. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.
Samples analyzed by EMSL Analytical, Inc. Depew, NY NYS ELAP 11606

Initial report from 11/23/2012 10:29:40

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone/Fax: (716) 651-0030 / (716) 651-0394
http://www.emsl.com buffalolab@emsl.com

EMSL Order: 141205681
CustomerID: RFWE53
CustomerPO:
ProjectID: RFP 247

Mike Garibaldi
Weston Solutions (King Georges Post)
1090 King Georges Post Road
Suite 201
Edison, NJ 08837

Phone: (732) 585-4400
Fax:
Received: 11/16/12 6:05 PM
Analysis Date: 11/23/2012
Collected: 11/15/2012

Project: **RFP No. 247 / Side ID #ZZ / TDD# TO-0027-00xx / RST Contract #EP-W-06-072 (No. 2-111612-145002-0001)**

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by PLM via the NY State ELAP 198.6 Method

SAMPLE ID	DESCRIPTION	APPEARANCE	MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES
P001-BULK-019-001 *141205681-0019*	P001-BULK-019	Gray Non-Fibrous Homogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-020-001 *141205681-0020*	P001-BULK-020	Black Fibrous Homogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-021-001 *141205681-0021*	P001-BULK-021	Black /Silver Non-Fibrous Heterogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-025-001 *141205681-0025*	P001-BULK-025	Gray Non-Fibrous Homogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-026-001 *141205681-0026*	P001-BULK-026	Gray Non-Fibrous Homogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-027-001 *141205681-0027*	P001-BULK-027	Black Fibrous Homogeneous	100% Other	None	**Inconclusive: No Asbestos Detected**
P001-BULK-028-001 *141205681-0028*	P001-BULK-028	Black Fibrous Homogeneous	90.7% Other	None	**9.3% Chrysotile** **9.3% Total**

Analyst(s)
Rachel Giese (1)
Taron Williams (14)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or other approved signatory

*Polarized Light Microscopy (PLM) is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative Transmission Electron Microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing. The test results contained within this report meet the requirements of NELAC unless otherwise noted. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. The above test report relates only to the items tested. EMSL bears no responsibility for sample collection activities or analytical method limitations. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.
Samples analyzed by EMSL Analytical, Inc. Depew, NY NYS ELAP 11606

Initial report from 11/23/2012 10:29:40

13. TEM NOB Narrative

TEM NOB Narrative

TEM NOB samples were prepped and analyzed via the NYSDOH-ELAP 198.4 method.

Organic reduction is performed on the sample by ashing (using a muffle furnace) followed by acid digestion to remove the carbonate mineral. Mass determinations are recorded after each step – determining the % loss for each type of matrix materials. The reduced sample is analyzed for asbestos following TEM analysis.

There were no problems encountered in the course of this project and no corrective actions taken.

Type of scope used are Hitachi H-600AB

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone/Fax: (716) 651-0030 / (716) 651-0394
http://www.emsl.com buffalolab@emsl.com

EMSL Order:	141205681
CustomerID:	RFWE53
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ProjectID:	RFP 247

Mike Garibaldi
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Suite 201
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Phone:	(732) 585-4400
Fax:	
Received:	11/16/12 6:05 PM
Analysis Date:	11/23/2012
Collected:	11/15/2012

Project: **RFP No. 247 / Side ID #ZZ / TDD# TO-0027-00xx / RST Contract #EP-W-06-072 (No. 2-111612-145002-0001)**

Test Report: Asbestos Analysis of Non-Friable Organically Bound materials by Transmission Electron Microscopy via NYS ELAP Method 198.4

SAMPLE ID	DESCRIPTION	APPEARANCE	MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES	% TOTAL ASBESTOS
P001-BULK-001-001 *141205681-0001*	P001-BULK-001	Black Fibrous Heterogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-002-001 *141205681-0002*	P001-BULK-002	Black Fibrous Heterogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-007-001 *141205681-0007* Not Analyzed	P001-BULK-007					
~1-BULK-008-001 *.05681-0008*	P001-BULK-008	Black Fibrous Homogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-009-001 *141205681-0009*	P001-BULK-009	Black Fibrous Homogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-010-001 *141205681-0010*	P001-BULK-010	Rust Non-Fibrous Homogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-015-001 *141205681-0015*	P001-BULK-015	Tan Non-Fibrous Homogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-016-001 *141205681-0016* Not Analyzed	P001-BULK-016					

Analyst(s)
Rachel Giese (12)

Rhonda McGee
Rhonda McGee, Laboratory Manager
or other approved signatory

Initial report from 11/23/2012 10:29:40

EMSL

EMSL Analytical, Inc.
490 Rowley Road, Depew, NY 14043
Phone/Fax: (716) 651-0030 / (716) 651-0394
http://www.emsl.com buffalolab@emsl.com

EMSL Order:	141205681
CustomerID:	RFWE53
CustomerPO:	
ProjectID:	RFP 247

Attn: **Mike Garibaldi**
Weston Solutions (King Georges Post)
1090 King Georges Post Road
Suite 201
Edison, NJ 08837

Phone:	(732) 585-4400
Fax:	
Received:	11/16/12 6:05 PM
Analysis Date:	11/23/2012
Collected:	11/15/2012

Project: **RFP No. 247 / Side ID #ZZ / TDD# TO-0027-00xx / RST Contract #EP-W-06-072 (No. 2-111612-145002-0001)**

Test Report: Asbestos Analysis of Non-Friable Organically Bound materials by Transmission Electron Microscopy via NYS ELAP Method 198.4

SAMPLE ID	DESCRIPTION	APPEARANCE	MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES	% TOTAL ASBESTOS
P001-BULK-019-001 *141205681-0019*	P001-BULK-019	Gray Non-Fibrous Homogeneous	100.0% Other	None	<1% Anthophyllite	<1
P001-BULK-020-001 *141205681-0020*	P001-BULK-020	Black Fibrous Homogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-021-001 *141205681-0021*	P001-BULK-021	Black /Silver Non-Fibrous Heterogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-025-001 *05681-0025*	P001-BULK-025	Gray Non-Fibrous Homogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-026-001 *141205681-0026*	P001-BULK-026	Gray Non-Fibrous Homogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-027-001 *141205681-0027*	P001-BULK-027	Black Fibrous Homogeneous	100.0% Other	None	No Asbestos Detected	
P001-BULK-028-001 *141205681-0028* Not Analyzed	P001-BULK-028					

Analyst(s)
Rachel Giese (12)

Rhonda McGee
Rhonda McGee, Laboratory Manager
or other approved signatory

This laboratory is not responsible for % asbestos in total sample when the residue only is submitted for analysis. The above report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL Analytical, Inc. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.
Samples analyzed by EMSL Analytical, Inc. Depew, NY NYS ELAP 11606

Initial report from 11/23/2012 10:29:40

3. Chain of Custody

141205681

Weston Solutions, Inc.- RST 2
EPA Contract Number: EP-W-06-072
Hand-delivered
Date: 11/16/2012

CHAIN OF CUSTODY RECORD
RFP# 247
Contact Name: Mike Garibaldi
Contact Phone: 908-565-2971

No: 2-111612-145002-0001
Cooler #: 1
Lab: EMSL Analytical, Inc.
Lab Phone: 716-651-0030

Lab #	Sample #	Location	Collected	Sample Time	Sample Type	Collection Method	Numb Cont	Container	Analyses
	P001-BULK-001-001	P001-BULK-001	11/15/2012	09:40	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-002-001	P001-BULK-002	11/15/2012	09:48	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-003-001	P001-BULK-003	11/15/2012	10:00	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-004-001	P001-BULK-004	11/15/2012	10:12	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-005-001	P001-BULK-005	11/15/2012	10:25	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-006-001	P001-BULK-006	11/15/2012	10:33	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-007-001	P001-BULK-007	11/15/2012	10:45	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-008-001	P001-BULK-008	11/15/2012	10:54	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-009-001	P001-BULK-009	11/15/2012	11:07	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-010-001	P001-BULK-010	11/15/2012	11:18	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-011-001	P001-BULK-011	11/15/2012	11:25	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-012-001	P001-BULK-012	11/15/2012	11:37	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-013-001	P001-BULK-013	11/15/2012	11:33	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-014-001	P001-BULK-014	11/15/2012	11:46	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-015-001	P001-BULK-015	11/15/2012	11:51	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-016-001	P001-BULK-016	11/15/2012	12:02	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-017-001	P001-BULK-017	11/15/2012	12:10	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-018-001	P001-BULK-018	11/15/2012	12:36	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-019-001	P001-BULK-019	11/15/2012	13:45	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N

Special Instructions: Analyze samples at 1 week turnaround time for written results.	SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
all Analysis	Mike Garibaldi	11/16/12									
	[signature]	11/16/12			6:05pm						

05681

R2-0014928

14120 5681

Weston Solutions, Inc.- RST 2
EPA Contract Number: EP-W-06-072
Hand-delivered
Date: 11/16/2012

CHAIN OF CUSTODY RECORD
RFP# 247
Contact Name: Mike Garibaldi
Contact Phone: 908-565-2971

No: 2-111612-145002-0001
Cooler #: 1
Lab: EMSL Analytical, Inc.
Lab Phone: 716-651-0030

Lab #	Sample #	Location	Collected	Sample Time	Sample Type	Collection Method	Numb Cont	Container	Analyses
	P001-BULK-020-001	P001-BULK-020	11/15/2012	14:12	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-021-001	P001-BULK-021	11/15/2012	14:25	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-022-001	P001-BULK-022	11/15/2012	14:38	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-023-001	P001-BULK-023	11/16/2012	09:26	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-024-001	P001-BULK-024	11/16/2012	09:54	Field Sample	Grab	1	Plastic bag	Asbestos-PLM
	P001-BULK-025-001	P001-BULK-025	11/16/2012	10:15	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-026-001	P001-BULK-026	11/16/2012	10:17	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-027-001	P001-BULK-027	11/16/2012	10:35	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N
	P001-BULK-028-001	P001-BULK-028	11/16/2012	10:50	Field Sample	Grab	1	Plastic bag	Asbestos-PLM N

Special Instructions: Analyze samples at 1 week turnaround time for written results.

SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
All Analysis	Mike Garibaldi	11/16/12									
	[signature]	11/16/12			6:05 pm						

105681

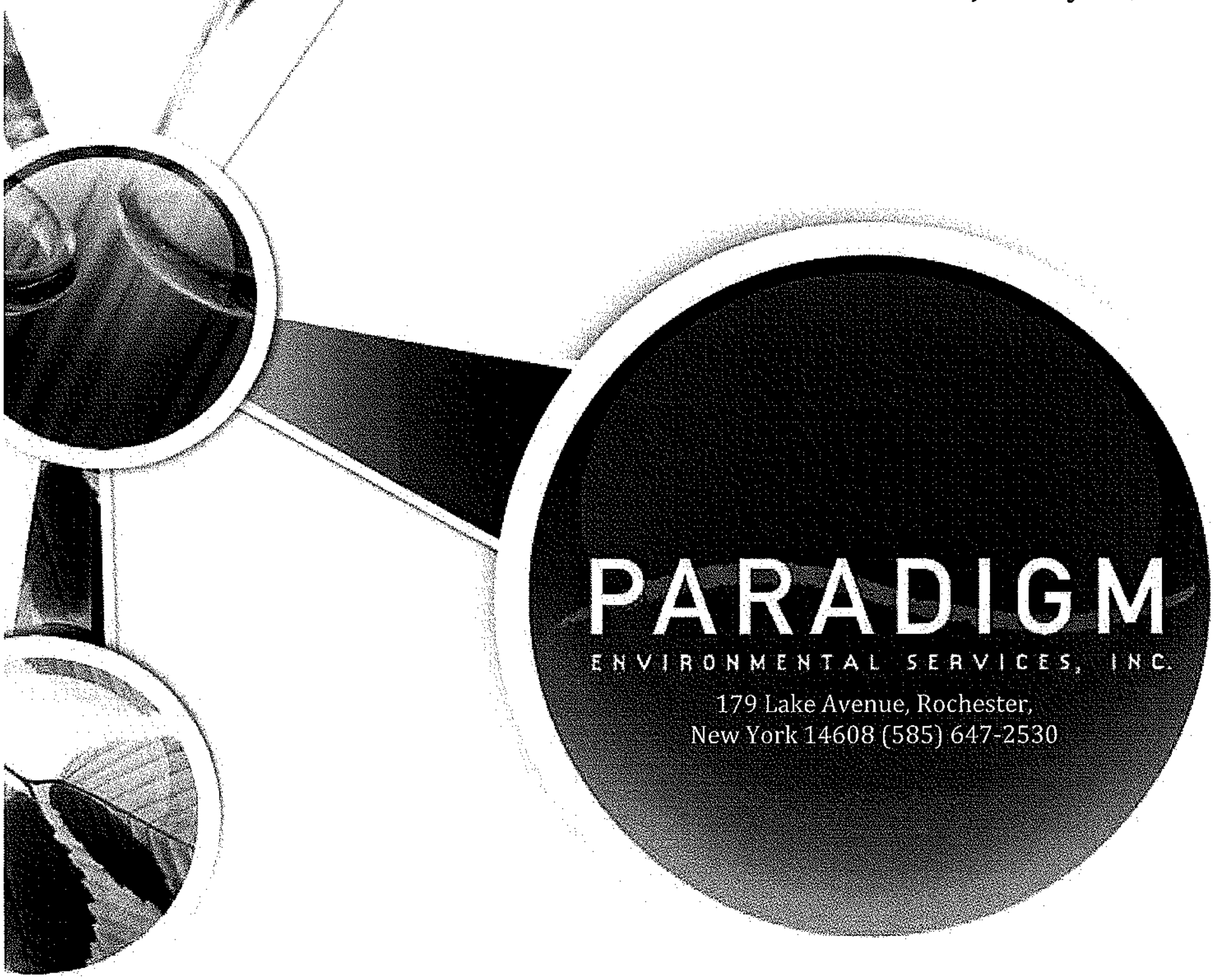
R2-0014929

ATTACHMENT E

Asbestos Survey Report

Limited Visual Asbestos Survey
at
Flintkote Site
198-300 Mill Street
Lockport, New York
November 15 and 16, 2012

Date Amended January 25, 2013



Prepared for:
Weston Solutions, Inc.
1090 King Georges Post Road, Suite 201
Edison, New Jersey 08837-3703
Job Number: 12-1082

FLINTKOTE SITE
198 AND 300 MILL STREET
LOCKPORT, NEW YORK

TABLE OF CONTENTS

INTRODUCTION

Paradigm Environmental Services, Inc. was retained by **Weston Solutions, Inc**, on **November 15 and 16, 2012** to conduct a visual inspection and to determine quantities of suspect asbestos containing materials located at the **Flintkote Site, 198 and 300 Mill Street, Lockport, New York. The premise of this investigation was to identify and quantify suspect asbestos containing materials located at the Flintkote Site and point out these materials to Weston Solutions personnel. Weston Solutions personnel then made sampling decisions and collected samples for independent analysis. This survey was amended on January 25, 2013 due to changes per the request of the client.**

The objective of this inspection was to identify and assess with due diligence the locations, quantities, friability and condition of suspect asbestos containing materials at the above referenced location. Envoy Environmental Consultants inspector Matt Joyce (AH#07-08652) conducted this inspection as directed by Paradigm Environmental Services, Inc. with the procedures and guidelines dictated by state and federal regulatory agencies. The inspector of selected materials for inclusion in this report through an understanding of the historical uses of asbestos in general. Generally, if a building material within a structure could contain asbestos the material was included in the survey.

LIMITATIONS

The information provided in this report was compiled from field observations at the **Flintkote Site, 198 and 300 Mill Street, Lockport, New York.** Materials noted and recorded are intended to represent subject site at the time and date that the observations were made. Conclusions provided in this report are based on the assumption that materials identified are homogenous throughout their application. Determinations of suspect asbestos containing materials within the building were subject to the accessibility of each individual area or space. Envoy Environmental Consultants Inc. and Paradigm Environmental Services, Inc. accepts no responsibility for the content of building materials within areas or spaces that were unknown to us, not reasonably accessible, or not part of the scope of the project as defined by the client. Envoy Environmental Consultants Inc. and Paradigm Environmental Services, Inc. assumes no liability for any buildings that were not identified by the client that may fall under state or federal regulation. All conclusions provided in this report are based on the visual assessment that was performed at the above mentioned site on the above mentioned dates.

- **Sampling decisions and sample collections was made by Weston Solutions, Inc.**
- **A gasket sample was collected in Building D Basement; it has been brought to this client's attention that other gasket/flange materials maybe present inside pipe units**
- **Two light fixtures were tested at different areas of the site; gaskets inside the lights were metal.**
- **Window glaze has been quantified based on glaze as well as the glaze residue, which remains on the frames**
- **Due to unsafe surroundings, there was limited access around the exterior of the site**

All quantities are approximations and must be field verified by the contractor prior to the submittal of bids. Contractor bids are expected to be based on their own determination of quantities and not the quantities stated in this report.

This asbestos survey report is not intended to be a bid document for a scope of work for the asbestos abatement contractor. The survey report only identifies and assesses the location, quantity and condition of asbestos materials at the subject site. The asbestos survey report is intended to be used as a tool in the development of an asbestos abatement project design or work scope. Under the Code Rule regulation this task can only be performed by a Certified Project Designer.

CONCLUSIONS

Paradigm Environmental Services, Inc. was retained to perform a limited visual asbestos survey from **Flintkote Site, 198 and 300 Mill Street, Lockport, New York** on **November 15 and 16, 2012**. A New York State certified inspector visually assessed suspect asbestos containing materials from the above mentioned site. Samples collected and analysis was the responsibility of Weston Solutions, Inc.

Transmittal of Building/Structure Asbestos Survey Information – As required by New York State Industrial Code Rule 56, one (1) copy of the results of the building/structure asbestos survey shall be immediately transmitted by the building/structure owner as follows:

- One (1) copy of the completed asbestos survey shall be sent by the owner or their agent to the local entity charged with issuing a permit for such demolition, renovation, remodeling or repair work under State or local laws.

- The completed asbestos survey for controlled demolition (as per Subpart 56-11.5) or pre-demolition asbestos projects shall be submitted to the appropriate Asbestos Control Bureau district office.

- The completed asbestos survey shall be kept on the construction site with the asbestos notification and variance, if required, throughout the duration of the asbestos project and any associated demolition, renovation, remodeling or repair project.

The following is a brief description of the space by space survey.

Col. 1	*Col. 2*	*Col. 3*	*Col. 4*	*Col. 5*	*Col. 6*	*Col.7*	*Col. 8*	*Col. 9*
Area	*Sample ID*	*Material Description*	*Location of Material*	*Condition*	*Friable Non-Friable NOB*	*SQ FT*	*Lin FT*	*Units*

1. Column 1: indicates the area and estimated square footage of the area referenced to the attached map/drawing.
2. Column 2: indicates the bulk sample numbers that were taken in the area indicated in column 1, by Weston personnel.
3. Column 3: gives a brief description of the material that is to be treated as asbestos containing as determined by the inspector. At times non-asbestos materials are contaminated with asbestos, therefore must be treated as asbestos.
4. Column 4: indicates a brief description of the location of the material in the room and not the location where the sample was taken from. You will find locations of where each sample was taken from on the analytical sampling results.
5. Column 5: indicates the physical condition of the material as assessed by the inspector in the space indicated in column 1, according to the condition description described below. For the purpose of this report, the condition of the ACM will be reported in good, fair or poor condition. Conditions will be listed in column 6 of the survey report will be as follows;
   *a. **Good:*** means material is intact with no visible damage.
   *b. **Fair:*** means material contains fewer than 10% distributed damage or 25% localized damage.
   *c. **Poor:*** means material contains over 10% distributed damage or 25% localized damage.
   Conditions listed in column 6 of the space by space survey report are only related to the specific material for the specific space.
6. Column 7: indicates the friability of the material in that space as determined by the inspector and the analytical laboratory consistent with Code Rule 56 and EPA regulations.
7. Column 9: indicates the square footage of ACM material found in the space.
8. Column 10: indicates the linear footage of ACM material found in the space. Pipe insulation that is two feet or greater in diameter is required to be reported in square feet according to code Rule 56.
9. Column 11: indicates the units of ACM material found in the space.

SUSPECT ASBESTOS CONTAINING MATERIALS
SPACE BY SPACE SUMMARY FOR
Flintkote Site
198-300 Mill Street, Lockport, New York

Area	Sample ID	Material Description	Location of Material	Condition	Friable** Non-Friable NOB	SQ FT	Lin. FT	Units
			Building A					
Basement 2925 square feet	019	Gray Window Glaze	Around Interior Window Frames	Poor	**Non-Friable**		**256**	
	020, 021	Black Pipe Wrap and Mastic	On Pipe Near Rear Entrance	Fair	**Friable**		**20**	
	001, 002	Tar/Vapor Barrier	Ceiling and Walls	Poor	**Non-Friable**	**509**		
	023	Wall Plaster	Walls	Poor	**Non-Friable**	**330**		
First Floor 1975 square feet	025, 026	Cream Floor Tile and Black Floor Tile Mastic	On Floor Throughout Mill Street Side of Building	Poor	**Non-Friable**	**500**		
Exterior	019	Window Glaze	Around Exterior Windows	Poor	**Non-Friable**		**140**	
	016	Roofing Material	Roof	Poor	**Non-Friable**	**1975**		
			Building B					
Basement 750 square feet	023	Gray Wall Plaster	Walls	Poor	**Non-Friable**	**4020**		
	001, 002	Tar/Vapor Barrier	Throughout Area on Walls Behind Plaster	Poor	**Non-Friable**	**U**	**U**	**U**
First Floor 750 square feet	023	Gray Wall Plaster	Walls	Poor	**Non-Friable**	**2020**		
Second Floor	N/A	Assume All Suspect Asbestos Containing Materials	Area Inaccessible Due to Lack of Support Structure			**U**	**U**	**U**
Exterior	028	Flashing	On Mill Street Side of Exterior Brick Wall	Poor	**Non-Friable**	**21**		
	N/A	Assume All Suspect Asbestos Containing Materials	Roof Inaccessible Due to Unsafe Support Structure			**U**	**U**	**U**
			Building C					
Basement 2125 square feet	009	Gray Pipe Wrap	On Pipe Near Fan Unit	Fair	**Friable**		**12**	
	022	Gray Vibration Cloth	Around Fan Unit	Fair	**Friable**	**12**		
	001, 002	Tar/Vapor Barrier	Throughout Area on Walls and Floors	Fair	**Non-Friable**	**U**	**U**	**U**
	003	Fabric Debris	Throughout Entire Area	Fair	**Friable**	**U**	**U**	**U**
First Floor	007	Roofing Material Debris	On Floor Throughout Area	Fair	**Non-Friable**	**U**	**U**	**U**
	N/A	Assume All Suspect Asbestos Containing Materials	Limited Accessible Due to Roof Collapsed			**U**	**U**	**U**
Machine Room 2310 square feet	024	Gray Pipe Insulation	On Pipes Near Silo	Fair	**Friable**		**74**	
	001, 002	Tar/Vapor Barrier	Throughout Area on Walls and Floors	Fair	**Non-Friable**	**U**	**U**	**U**
	003	Fabric Debris	Throughout Entire Area	Fair	**Friable**	**U**	**U**	**U**
	N/A	Mudded Joint Packing and Pipe Insulation	Debris on Ground Below Pipe Insulation that is Intact	Fair	**Friable**		**135**	
	N/A	Pipe Insulation	In Barrel on Ground	Fair	**Friable**		**20**	
Exterior	N/A	Assume All Suspect Asbestos Containing Materials	Area Inaccessible Due to Unsafe Support Structure			**U**	**U**	**U**

** This asbestos survey is a multi-page document which must be viewed in its entirety; see limitations.

SUSPECT ASBESTOS CONTAINING MATERIALS
SPACE BY SPACE SUMMARY FOR
Flintkote Site
198-300 Mill Street, Lockport, New York

Area	Sample ID	Material Description	Location of Material	Condition	Friable** Non-Friable NOB	SQ FT	Lin. FT	Units
			Building D					
Basement	008	Gray Pipe Insulation	On Pipe Above Manhole	Poor	**Friable**		**10**	
3950 square feet	010	Red Gasket	Along Pipe Connecting Fitting	Fair	**Friable**		**2**	
	001, 002	Tar/Vapor Barrier	On Walls and Floor	Poor	**Non-Friable**	**4815**		
	003	Fabric Debris	Throughout Entire Area	Poor	**Friable**	**U**	**U**	**U**
Sub-Basement	011	Gray Fabric Debris	On Walls and Floor	Poor	**Friable**	**U**	**U**	**U**
	001, 002	Tar/Vapor Barrier	On Walls and Floor	Poor	**Non-Friable**	**U**	**U**	**U**
	N/A	Assume All Suspect Asbestos Containing Materials	Limited Access to Sub-Basement			**U**	**U**	**U**
Boiler Room	012	Gray Debris	Inside Boiler Case	Poor	**Friable**	**400**		
1205 square feet	013	Gray Fire Brick	Inside Boiler Doors	Fair	**Non-Friable**	**13**		
	014	Light Gray Debris	Behind Boiler Metal Frame Work	Poor	**Friable**	**1900**		
	015	Yellow Debris	Behind Boiler Metal Frame Work	Poor	**Friable**	**1900**		
	016	Black Roofing	Roof and Ground Around Boiler Room	Poor	**Non-Friable**	**1900**		
	017	Gray Wall Plaster	Walls	Poor	**Non-Friable**	**3600**		
			Building E					
First Floor	006	Gray Ceiling Panel	Floor	Poor	**Non-Friable**	**48**		
3980 square feet	007	Black Roofing Debris	Floor	Poor	**Non-Friable**	**1850**		
Second Floor	N/A	Assume All Suspect Asbestos Containing Materials	Area Inaccessible Due to Lack of Support Structure			**U**	**U**	**U**
Exterior	028	Black Flashing	On Exterior Bricks	Poor	**Non-Friable**	**45**		
	019	Window Glaze	Around Windows	Poor	**Non-Friable**		**160**	
	N/A	Assume All Suspect Asbestos Containing Materials	Roof Inaccessible Due to Lack of Support Structure			**U**	**U**	**U**
Basement	001, 002	Black Tar/Vapor Barrier	On Brick Walls and Floor	Poor	**Non-Friable**	**U**		
4416 square feet	003	Gray Fabric Debris	On Walls and Floor	Poor	**Friable**	**U**	**U**	**U**
First Floor	004	Black Cloth Material	On Ceiling Rack	Fair	**Non-Friable**	**45**		
4416 square feet	005	Gray Debris	Inside Wood Furnace	Poor	**Friable**	**250**		
Exterior	027	Dark Gray Roof Shingle	Roof - Two Layers	Poor	**Non-Friable**	**4820**		
	028	Flashing	North End of Building	Poor	**Non-Friable**	**25**		
	019	Window Glaze	Around Windows	Poor	**Non-Friable**		**340**	
	N/A	Assume All Suspect Asbestos Containing Materials	Top of Roof Inaccessible Due to Lack of Support Structure			**U**	**U**	**U**
			Silo					
Interior	N/A	Assume All Suspect Asbestos Containing Materials	Interior of Silo Inaccessible			**U**	**U**	**U**

SUSPECT ASBESTOS CONTAINING MATERIALS
SPACE BY SPACE SUMMARY FOR
Flintkote Site
198-300 Mill Street, Lockport, New York

Area	Sample ID	Material Description	Location of Material	Condition	Friable** Non-Friable NOB	SQ FT	Lin. FT	Units
Exterior	018	Gray Brick	Around Exterior of Silo	Poor	Non-Friable	5050		
						36048	1169	0

All materials assumed positive for asbestos containing materials by inspector.
U *- Inspector unable to determine quantity; see limitations*

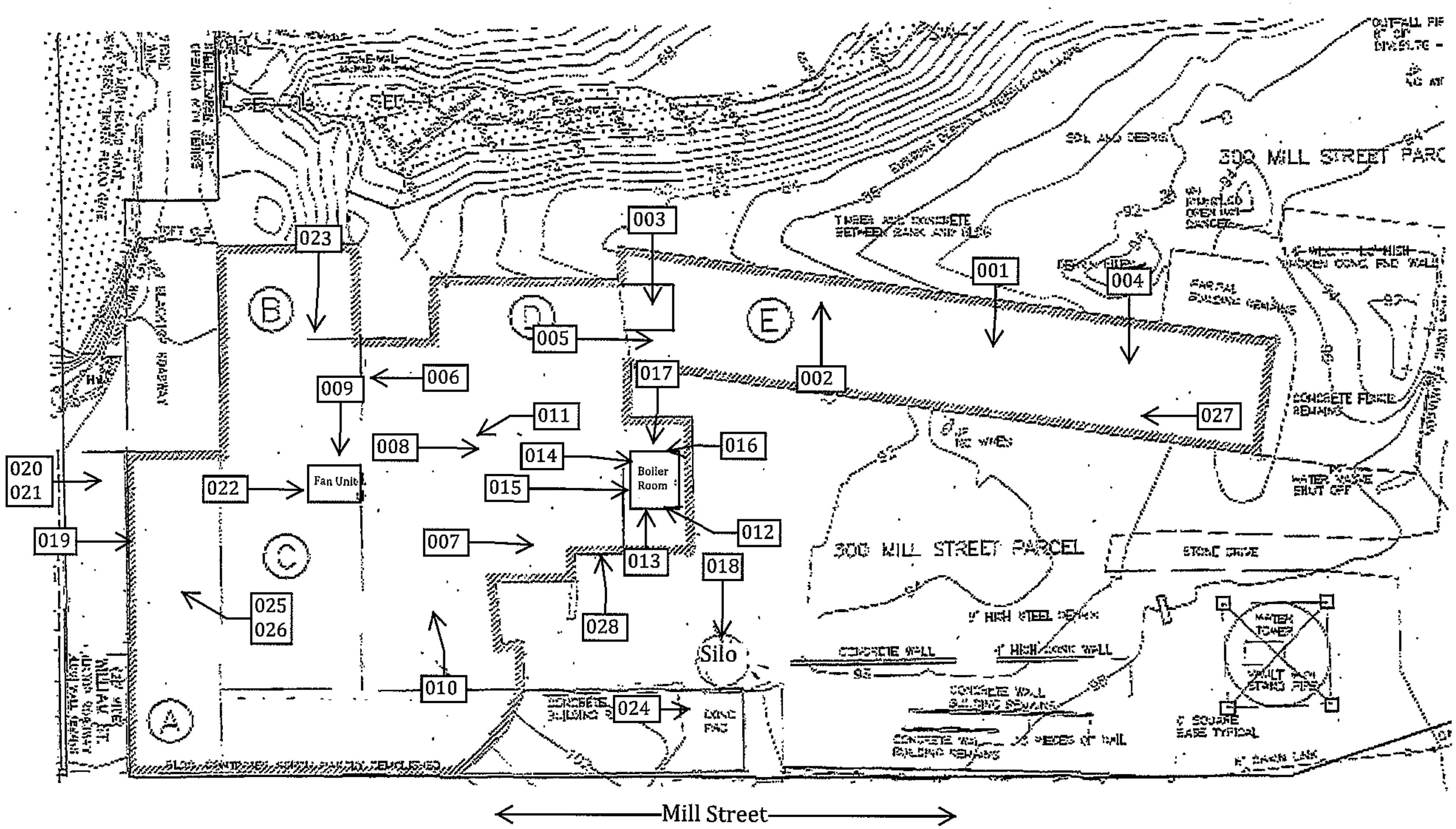
All quantities in this report are approximations and must be field verified by the Abatement contractor. Contractor bids are expected to be based on their own determinations of quantities and not the approximate quantities stated in this report.

Paradigm certifies that this report regarding the Flintkote Site, 198-300 Mill Street, Lockport, New York is based on the observations of the inspector and believes it to be an accurate representation of the conditions as they existed on November 15 and 16, 2012.

Matt Joyce
Envoy Environmental Consultants, Inc.
Inspector # AH 07-08652

Client: Weston Solutions, Inc.
Location: Flintkote Site, Lockport, New York
Date: November 15 and 16, 2012
Project Number: 12-1082

Sample Location Drawings



Certifications

NEW YORK STATE - DEPARTMENT OF LABOR
DIVISION OF SAFETY AND HEALTH
LICENSE AND CERTIFICATE UNIT
STATE CAMPUS BUILDING 12
ALBANY, NY 12240

ASBESTOS HANDLING LICENSE

Envoy Environmental Consultants Inc.

57 Ambrose Street

Rochester, NY 14608

FILE NUMBER: 02-0527
LICENSE NUMBER: 28454
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 05/18/2012
EXPIRATION DATE: 06/30/2013

Duly Authorized Representative – Paul Mahoney

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

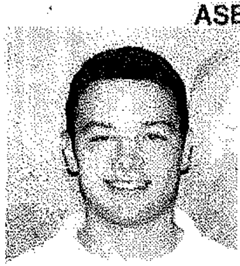
STATE OF NEW YORK DEPARTMENT OF LABOR

Maureen A. Cox

Maureen A. Cox, Director
FOR THE COMMISSIONER OF LABOR

SH 432 (4-07)

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



MATTHEW T JOYCE
CLASS(EXPIRES)
C ATEC(06/13) D INSP(06/13)
H PM (06/13)

CERT# 07-08652
DMV# 227745086
MUST BE CARRIED ON ASBESTOS PROJECTS

ATTACHMENT F

Photo Documentation Log

Photo Documentation Log
18 Mile Creek Site, Removal Assessment, November 15 - 16, 2012
Lockport, New York

View facing southwest of the former Flintkote Building at the 18 Mile Creek site.

View facing north of the collapsed area at the main floor at Building E.

View of the deteriorated drum containing asbestos pipe insulation at the Area C basement.

Close-up view of the asbestos pipe insulation in the deteriorated drum at the Area C basement.

View of the asbestos pipe insulation identified at the Area C basement.

View of the deteriorated Boiler at Area F2. Note the ash piles on equipment.

View of the lint/process fluff on the wall at the basement of Area D.

View of the SACM roofing material from the boiler room catwalk at Area F2.

Sample Name	Location	Collection Date	Analysis	Analyte	Result	Unit	Validator Qualifier	Interpreted Qualifier	Detection Limit	Detection Limit Unit
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Iron	75000	mg/kg			80	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Bis(2-Ethylhexyl)Phthalate	69000	ug/kg	J	J	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Calcium	17000	mg/kg			80	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Aluminum	5100	mg/kg			16	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Magnesium	3900	mg/kg			80	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Fluoranthene	2500	ug/kg	K	K	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Phenanthrene	2400	ug/kg	K	K	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2,4-Dinitrophenol	2400	ug/kg	UJ	UJ	2400	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	4,6-Dinitro-2-Methylphenol	2400	ug/kg	UJ	UJ	2400	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Hexachlorocyclopentadiene	2400	ug/kg	UJ	UJ	2400	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Pentachlorophenol	2400	ug/kg	UJ	UJ	2400	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Zinc	2200	mg/kg			3.2	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Pyrene	1900	ug/kg	K	K	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Chrysene	1300	ug/kg	J	J	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Lead	1200	mg/kg			1.3	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Benzo(B)Fluoranthene	1200	ug/kg	J	J	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Benzo(A)Anthracene	1000	ug/kg	J	J	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2,3,4,6-Tetrachlorophenol	970	ug/kg	U	U	970	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Benzo(A)Pyrene	970	ug/kg	J	J	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	4-Nitrophenol	970	ug/kg	U	U	970	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Copper	870	mg/kg			1.6	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Manganese	840	mg/kg			0.80	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Indeno(1,2,3-Cd)Pyrene	720	ug/kg	J	J	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Benzo(G,H,I)Perylene	700	ug/kg	J	J	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Potassium	660	mg/kg	K	K	80	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Benzo(K)Fluoranthene	510	ug/kg	J	J	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Anthracene	490	ug/kg	K	K	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Butylbenzylphthalate	470	ug/kg	K	K	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Toxaphene	450	ug/kg	U	U	450	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Naphthalene	430	ug/kg	K	K	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Carbazole	420	ug/kg	K	K	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Fluorene	340	ug/kg	K	K	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	1,2,4,5-Tetrachlorobenzene	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Acetophenone	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Atrazine	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Benzaldehyde	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Caprolactam	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Biphenyl	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2-Methylnaphthalene	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Acenaphthene	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Acenaphthylene	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Dibenzo(A,H)Anthracene	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2,4,5-Trichlorophenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2,4,6-Trichlorophenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2,4-Dichlorophenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2,4-Dimethylphenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2,4-Dinitrotoluene	290	ug/kg	UJ	UJ	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2,6-Dinitrotoluene	290	ug/kg	UJ	UJ	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2-Chloronaphthalene	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2-Chlorophenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2-Methylphenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2-Nitrophenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	2-Nitroaniline	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	3,3'- Dichlorobenzidine	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	3-Nitroaniline	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	4-Bromophenyl-Phenylether	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	4-Chloro-3-Methylphenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	4-Chloroaniline	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	4-Chlorophenyl-Phenylether	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	4-Methylphenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	4-Nitroaniline	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Bis(-2-Chloroethoxy)Methane	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Bis(2-Chloroethyl)Ether	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Bis(2-Chloroisopropyl)Ether	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Dibenzofuran	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Diethylphthalate	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Dimethyl Phthalate	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Di-N-Butyl Phthalate	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Di-N-Octyl Phthalate	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Hexachlorobenzene	290	ug/kg	U	U	290	ug/kg

R2-0014948

Sample Name	Location	Collection Date	Analysis	Analyte	Result	Unit	Validator Qualifier	Interpreted Qualifier	Detection Limit	Detection Limit Unit
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Hexachlorobutadiene	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Hexachloroethane	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Isophorone	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Nitrobenzene	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	N-Nitroso-Di-N-Propylamine	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	N-Nitrosodiphenylamine	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL SVOCs	Phenol	290	ug/kg	U	U	290	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Sodium	280	mg/kg	J	J	160	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Barium	250	mg/kg			16	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1221	150	ug/kg	U	U	150	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Chromium	120	mg/kg			0.80	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	4,4'-DDT	91	ug/kg	J	J	12	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1016	75	ug/kg	U	U	75	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1232	75	ug/kg	U	U	75	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1242	75	ug/kg	UL	UL	75	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1248	75	ug/kg	U	U	75	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1254	75	ug/kg	U	U	75	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1260	75	ug/kg	U	U	75	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1262	75	ug/kg	U	U	75	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1268	75	ug/kg	U	U	75	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Nickel	65	mg/kg			3.2	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Methoxychlor	60	ug/kg	UL	UL	60	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Antimony	39	mg/kg			3.2	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Arsenic	37	mg/kg			2.5	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Vanadium	21	mg/kg			3.2	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Cobalt	14	mg/kg			3.2	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Cadmium	12	mg/kg			0.48	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Dieldrin	12	ug/kg	UL	UL	12	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	4,4'-DDE	12	ug/kg	UJ	UJ	12	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Endrin	12	ug/kg	UJ	UJ	12	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Endosulfan II	12	ug/kg	UL	UL	12	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	4,4'-DDD	12	ug/kg	U	U	12	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Endosulfan sulfate	12	ug/kg	UL	UL	12	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Endrin ketone	12	ug/kg	U	U	12	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Endrin aldehyde	12	ug/kg	UL	UL	12	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	beta-BHC	6.0	ug/kg	UL	UL	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	alpha-BHC	6.0	ug/kg	U	U	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	delta-BHC	6.0	ug/kg	UL	UL	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	gamma-BHC (Lindane)	6.0	ug/kg	UL	UL	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Heptachlor	6.0	ug/kg	UJ	UJ	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Aldrin	6.0	ug/kg	UL	UL	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Heptachlor epoxide	6.0	ug/kg	UL	UL	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	Endosulfan I	6.0	ug/kg	UL	UL	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	alpha-Chlordane	6.0	ug/kg	UL	UL	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TCL Pesticides/PCBs	gamma-Chlordane	6.0	ug/kg	UL	UL	6.0	ug/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Selenium	5.5	mg/kg			3.2	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Thallium	3.2	mg/kg	U	U	3.2	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Silver	2.2	mg/kg			0.80	mg/kg
P001-SD001-001	Building D Basement	11/14/2012	TAL Metals	Beryllium	0.48	mg/kg	U	U	0.48	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Pentachlorophenol	22000	ug/kg	J	J	1000	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Calcium	8600	mg/kg			38	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Iron	6500	mg/kg			3.8	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Lead	2300	mg/kg			0.60	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Aluminum	1500	mg/kg			7.5	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Sodium	1500	mg/kg			75	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Phenanthrene	1300	ug/kg	L	L	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Magnesium	1200	mg/kg			38	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2,4-Dinitrophenol	1000	ug/kg	UJ	UJ	1000	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	4,6-Dinitro-2-Methylphenol	1000	ug/kg	UJ	UJ	1000	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Hexachlorocyclopentadiene	1000	ug/kg	UJ	UJ	1000	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Potassium	890	mg/kg			38	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Zinc	440	mg/kg			1.5	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2,3,4,6-Tetrachlorophenol	420	ug/kg	U	U	420	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	4-Nitrophenol	420	ug/kg	U	U	420	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	4,4'-DDD	350	ug/kg	K	K	5.2	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	4,4'-DDT	300	ug/kg	J	J	5.2	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Copper	260	mg/kg			0.75	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Toxaphene	190	ug/kg	U	U	190	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	1,2,4,5-Tetrachlorobenzene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Acetophenone	130	ug/kg	U	U	130	ug/kg

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Sample Name	Location	Collection Date	Analysis	Analyte	Result	Unit	Validator Qualifier	Interpreted Qualifier	Detection Limit	Detection Limit Unit
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Atrazine	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Benzaldehyde	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Caprolactam	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Carbazole	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Biphenyl	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2-Methylnaphthalene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Acenaphthene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Acenaphthylene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Anthracene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Benzo(A)Anthracene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Benzo(A)Pyrene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Benzo(B)Fluoranthene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Benzo(G,H,I)Perylene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Benzo(K)Fluoranthene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Chrysene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Dibenzo(A,H)Anthracene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Fluoranthene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Fluorene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Indeno(1,2,3-Cd)Pyrene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Naphthalene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2,4,5-Trichlorophenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2,4,6-Trichlorophenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2,4-Dichlorophenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2,4-Dimethylphenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2,4-Dinitrotoluene	130	ug/kg	UJ	UJ	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2,6-Dinitrotoluene	130	ug/kg	UJ	UJ	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2-Chloronaphthalene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2-Chlorophenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2-Methylphenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2-Nitrophenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	2-Nitroaniline	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	3,3'- Dichlorobenzidine	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	3-Nitroaniline	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	4-Bromophenyl-Phenylether	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	4-Chloro-3-Methylphenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	4-Chloroaniline	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	4-Chlorophenyl-Phenylether	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	4-Methylphenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	4-Nitroaniline	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Bis(-2-Chloroethoxy)Methane	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Bis(2-Chloroethyl)Ether	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Bis(2-Chloroisopropyl)Ether	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Bis(2-Ethylhexyl)Phthalate	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Butylbenzylphthalate	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Dibenzofuran	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Diethylphthalate	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Dimethyl Phthalate	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Di-N-Butyl Phthalate	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Di-N-Octyl Phthalate	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Hexachlorobenzene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Hexachlorobutadiene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Hexachloroethane	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Isophorone	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Nitrobenzene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	N-Nitroso-Di-N-Propylamine	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	N-Nitrosodiphenylamine	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Phenol	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL SVOCs	Pyrene	130	ug/kg	U	U	130	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Barium	120	mg/kg			7.5	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Antimony	110	mg/kg			1.5	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Manganese	96	mg/kg			0.38	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Chromium	89	mg/kg			0.38	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aroclor 1221	65	ug/kg	U	U	65	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aroclor 1016	32	ug/kg	U	U	32	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aroclor 1232	32	ug/kg	U	U	32	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aroclor 1242	32	ug/kg	UL	UL	32	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aroclor 1248	32	ug/kg	U	U	32	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aroclor 1254	32	ug/kg	U	U	32	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aroclor 1260	32	ug/kg	U	U	32	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aroclor 1262	32	ug/kg	U	U	32	ug/kg

Sample Name	Location	Collection Date	Analysis	Analyte	Result	Unit	Validator Qualifier	Interpreted Qualifier	Detection Limit	Detection Limit Unit
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aroclor 1268	32	ug/kg	U	U	32	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Methoxychlor	26	ug/kg	UL	UL	26	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Nickel	17	mg/kg			1.5	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Dieldrin	5.2	ug/kg	UL	UL	5.2	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	4,4'-DDE	5.2	ug/kg	UJ	UJ	5.2	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Endrin	5.2	ug/kg	UJ	UJ	5.2	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Endosulfan II	5.2	ug/kg	UL	UL	5.2	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Endosulfan sulfate	5.2	ug/kg	UL	UL	5.2	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Endrin ketone	5.2	ug/kg	U	U	5.2	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Endrin aldehyde	5.2	ug/kg	UL	UL	5.2	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Arsenic	4.5	mg/kg			1.2	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Vanadium	4.5	mg/kg			1.5	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Cadmium	3.5	mg/kg			0.23	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	beta-BHC	2.6	ug/kg	UL	UL	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	alpha-BHC	2.6	ug/kg	U	U	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	delta-BHC	2.6	ug/kg	UL	UL	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	gamma-BHC (Lindane)	2.6	ug/kg	UL	UL	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Heptachlor	2.6	ug/kg	UJ	UJ	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Aldrin	2.6	ug/kg	UL	UL	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Heptachlor epoxide	2.6	ug/kg	UL	UL	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	Endosulfan I	2.6	ug/kg	UL	UL	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	alpha-Chlordane	2.6	ug/kg	UL	UL	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TCL Pesticides/PCBs	gamma-Chlordane	2.6	ug/kg	UL	UL	2.6	ug/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Silver	1.8	mg/kg			0.38	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Cobalt	1.6	mg/kg			1.5	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Selenium	1.5	mg/kg	U	U	1.5	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Thallium	1.5	mg/kg	U	U	1.5	mg/kg
P001-WS001-001	Building D 1st Floor	11/14/2012	TAL Metals	Beryllium	0.23	mg/kg	U	U	0.23	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Bis(2-Ethylhexyl)Phthalate	270000	ug/kg	K	K	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Pentachlorophenol	45000	ug/kg	J	J	1300	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Iron	14000	mg/kg			4.7	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Calcium	6100	mg/kg			47	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Aluminum	4900	mg/kg			9.3	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Zinc	1600	mg/kg			1.9	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Magnesium	1500	mg/kg			47	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	28-Nor-17.beta.(H)-hopane (03)	1400	ug/l	NJ	NJ		
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2,4-Dinitrophenol	1300	ug/kg	UJ	UJ	1300	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	4,6-Dinitro-2-Methylphenol	1300	ug/kg	UJ	UJ	1300	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Hexachlorocyclopentadiene	1300	ug/kg	UJ	UJ	1300	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2,3,4,6-Tetrachlorophenol	500	ug/kg	U	U	500	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	4-Nitrophenol	500	ug/kg	U	U	500	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Dieldrin	430	ug/kg			6.3	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Potassium	380	mg/kg			47	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Lead	300	mg/kg			0.74	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	4,4'-DDT	280	ug/kg	J	J	6.3	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Sodium	230	mg/kg			93	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Toxaphene	230	ug/kg	U	U	230	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Barium	220	mg/kg			9.3	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Manganese	150	mg/kg			0.47	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	1,2,4,5-Tetrachlorobenzene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Acetophenone	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Atrazine	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Benzaldehyde	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Caprolactam	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Carbazole	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Biphenyl	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2-Methylnaphthalene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Acenaphthene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Acenaphthylene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Anthracene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Benzo(A)Anthracene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Benzo(A)Pyrene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Benzo(B)Fluoranthene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Benzo(G,H,I)Perylene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Benzo(K)Fluoranthene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Chrysene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Dibenzo(A,H)Anthracene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Fluoranthene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Fluorene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Indeno(1,2,3-Cd)Pyrene	150	ug/kg	U	U	150	ug/kg

Sample Name	Location	Collection Date	Analysis	Analyte	Result	Unit	Validator Qualifier	Interpreted Qualifier	Detection Limit	Detection Limit Unit
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Naphthalene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Phenanthrene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2,4,5-Trichlorophenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2,4,6-Trichlorophenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2,4-Dichlorophenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2,4-Dimethylphenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2,4-Dinitrotoluene	150	ug/kg	UJ	UJ	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2,6-Dinitrotoluene	150	ug/kg	UJ	UJ	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2-Chloronaphthalene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2-Chlorophenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2-Methylphenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2-Nitrophenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	2-Nitroaniline	150	ug/kg	UL	UL	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	3,3'- Dichlorobenzidine	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	3-Nitroaniline	150	ug/kg	UL	UL	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	4-Bromophenyl-Phenylether	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	4-Chloro-3-Methylphenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	4-Chloroaniline	150	ug/kg	UL	UL	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	4-Chlorophenyl-Phenylether	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	4-Methylphenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	4-Nitroaniline	150	ug/kg	UL	UL	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Bis(-2-Chloroethoxy)Methane	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Bis(2-Chloroethyl)Ether	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Bis(2-Chloroisopropyl)Ether	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Butylbenzylphthalate	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Dibenzofuran	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Diethylphthalate	150	ug/kg			150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Dimethyl Phthalate	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Di-N-Butyl Phthalate	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Di-N-Octyl Phthalate	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Hexachlorobenzene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Hexachlorobutadiene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Hexachloroethane	150	ug/kg	UL	UL	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Isophorone	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Nitrobenzene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	N-Nitroso-Di-N-Propylamine	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	N-Nitrosodiphenylamine	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Phenol	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL SVOCs	Pyrene	150	ug/kg	U	U	150	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Chromium	110	mg/kg			0.47	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1221	78	ug/kg	U	U	78	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Copper	75	mg/kg			0.93	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Antimony	56	mg/kg			1.9	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	4,4'-DDE	52	ug/kg	J	J	6.3	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Arsenic	50	mg/kg			1.5	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1016	39	ug/kg	U	U	39	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1232	39	ug/kg	U	U	39	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1242	39	ug/kg	UL	UL	39	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1248	39	ug/kg	U	U	39	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1254	39	ug/kg	U	U	39	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1260	39	ug/kg	U	U	39	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1262	39	ug/kg	U	U	39	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aroclor 1268	39	ug/kg	U	U	39	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Methoxychlor	31	ug/kg	UL	UL	31	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	4,4'-DDD	25	ug/kg	K	K	6.3	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Nickel	14	mg/kg			1.9	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Cadmium	8.9	mg/kg			0.28	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Vanadium	6.9	mg/kg			1.9	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Endrin	6.3	ug/kg	UJ	UJ	6.3	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Endosulfan II	6.3	ug/kg	UL	UL	6.3	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Endosulfan sulfate	6.3	ug/kg	UL	UL	6.3	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Endrin ketone	6.3	ug/kg	U	U	6.3	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Endrin aldehyde	6.3	ug/kg	UL	UL	6.3	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Cobalt	4.3	mg/kg			1.9	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	beta-BHC	3.1	ug/kg	UL	UL	3.1	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	alpha-BHC	3.1	ug/kg	U	U	3.1	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	delta-BHC	3.1	ug/kg	UL	UL	3.1	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	gamma-BHC (Lindane)	3.1	ug/kg	UL	UL	3.1	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Heptachlor	3.1	ug/kg	UJ	UJ	3.1	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Aldrin	3.1	ug/kg	UL	UL	3.1	ug/kg

Sample Name	Location	Collection Date	Analysis	Analyte	Result	Unit	Validator Qualifier	Interpreted Qualifier	Detection Limit	Detection Limit Unit
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Heptachlor epoxide	3.1	ug/kg	UL	UL	3.1	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	Endosulfan I	3.1	ug/kg	UL	UL	3.1	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	alpha-Chlordane	3.1	ug/kg	UL	UL	3.1	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TCL Pesticides/PCBs	gamma-Chlordane	3.1	ug/kg	UL	UL	3.1	ug/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Selenium	1.9	mg/kg	U	U	1.9	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Thallium	1.9	mg/kg	U	U	1.9	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Silver	0.47	mg/kg	U	U	0.47	mg/kg
P001-WS002-001	Building C Basement	11/14/2012	TAL Metals	Beryllium	0.28	mg/kg	U	U	0.28	mg/kg

Attachment D

Costs for Purchasing Five Properties with Houses and Three Residential Lots on Water Street and Relocating the Residents

Residential Lot A	Assessed Value: $600 Adjusted Value $840
Residential Lot C	Assessed Value: $1,000 Adjusted Value: $1,400
Residential Lot F	Assessed Value: $1,000 Adjusted Value: $1,400

Average adjusted residential lot value - $1,200
Three properties @ 1,200 per property - $3,600

Residential Lot B (with house)	Assessed Value: $31,800 Adjusted Value: $44,520
Residential Lot D (with house)	Assessed Value: $11,900 Adjusted Value: $16,660
Residential Lot E (with house)	Assessed Value: $22,400 Adjusted Value: $31,360
Residential Lot G (with house)	Assessed Value: $24,500 Adjusted Value: $34,300
Residential Lot I (with house)	Assessed Value: $27,000 Adjusted Value: $37,800
Residential Lot H	Assessed Value: $5,100 Adjusted Value: $7,140

Average adjusted property value with house - $28,360
Six properties @ 28,360 per property - $170,160

Estimated average cost to closing for selling and purchasing of a house - $5,000 per property. Five properties -$15,000

Average cost moving cost per property with residence - $5,000 per property. Five properties -$15,000

Buyout of Residential Lots	$3,600
Buyout of Residential properties	$170,160

Property Acquisition Grand Total **$170,160**

Estimated Relocation Costs for 5 residential properties:
Relocation Benefits - Estimate is the maximum $22,500.00* for each property. Closing costs will typically be about $5000.00 leaving $17,500.00 for the Replacement Housing Payment. Due to the depressed area and low value of the properties, we may be faced with a Last Resort Housing situation.

5 x $22,500.00 = $112,500.00

Moving Costs – Estimate approx. $6,000.00 each. Residents have a choice of either conducting a self-move based on a move schedule identifying an amount per room or a commercial move where 3 estimates are obtained and we hire the lowest of the 3.

5 x $6,000.00 = $30,000.00

Utility Hook-ups – Estimate approx. $500.00 per house.

5 x $500.00 = $2,500.00

TOTAL **$145,000.00**

Corps Expenses (Acquisition and relocation of 5 residential properties and acquisition of 4 vacant lots)

Appraisals	$6,000.00 (contract)
	$5,000.00 (labor)
Title (Preliminary, update,closing)	$11,500.00 (contract)
	$17,000.00 (labor)

Attorney Travel $1,000.00 x 5 = $5,000.00 (includes estimated 5 trips for 9 closings – airfare, rental car and hotel).

Realty Specialist – Preparation of Offer to Sell, Prepare Comparable Housing Survey Package, Negotiations, prepare title contract, manage project.

$6,000.00 x 5 = $30,000.00
$3,000.00 x 4 = $12,000.00

Realty Specialist Travel - $1,000.00 x 5 = $5,000.00 (includes estimated 5 trips to include site inspection, present offers to sell and conduct comparable housing survey).

Supervision	$2,500.00
Clerical	$3,000.00
Budget (request checks, etc)	$3,000.00
Transfer Property to the State	$10,000.00
Project Close-out	$5,000.00
5% contingency	$5,750.00
M&S Fee	$2,415.00

TOTAL = $123,165.00

***Please note that the above costs do not include last resort housing, condemnation, or maintenance on the properties should they require lawn maintenance, snow removal and alarm system after they have been purchased by the Government.**

Attachment E
Estimated Costs for Demolition of the Former Flintkote Building
300 Mill Street, Lockport, NY

Building Demolition and C&D Removal

Building Demolition	
Demolish buildings and structures	$360,000
Disposal of Wooden Roof Transportation/Disposal	$27,000
Electrical/Non-salvageable	
Equipment Transportation/Disposal	$150,000
C&D Debris Excavator	$2,480
C&D Debris Transportation/Disposal C&D debris - 1,600 tons	$80,000
	$619,480

Friable and Non-Friable Asbestos Removal

Pre-Demolition Asbestos Survey Survey/Sampling	$5,000
Non-Friable Asbestos Abatement/Air Monitoring	$217,000
Friable Asbestos Abatement/Air Monitoring	$33,000
Project/Air Monitoring Air monitoring and project oversight	$500
	$255,500

Estimated total cost for demolition of the former Flintkote Building $874,980

Table 2a Cost Estimate for Alternative 2a - Capping, Institutional Controls and Long Term Monitoring, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Capital Costs					
Work Plan / Final Report	Includes submittals, meetings	1	LS	$27,400	$27,400
Institutional Controls	Environmental Easements	1	LS	$54,800	$54,800
Site Preparation and Engineering Controls					
Mobilization/Demobilization	Include site prep, trailers, staging ,etc. and demobilization.	1	LS	$54,800	$54,800
Health and Safety requirements	Officer; assume on-site 100% of project duration	65	Day	$900	$58,500
Community Air Monitoring	Particulate meters	4	Ea	$8,300	$33,200
Decontamination Pad & Containment	For equipment, personnel, and departing site vehicles	1	Setups	$3,300	$3,300
Surveying	2-person crew @ $100/hr, 8hr/day; assume 50% of project duration	33	Day	$1,800	$58,500
Traffic Control (Labor)	For roads adjacent to the residential properties, including Water St. Assume 1 person for 25% of project duration	16	Day	$700	$11,400
Remove / Relocate Existing Temporary Structures	Move sheds, pools, etc.	1	LS	$27,400	$27,400
Site Clearing					
Cut and chip heavy trees	Large trees and dense vegetation found along the creek banks; Assume 50% of entire property surface area	1	Acre	$15,400	$17,400
Grub stumps and remove - heavy	Large trees and dense vegetation found along the creek banks; Assume 50% of entire property surface area	1	Acre	$8,275	$9,300
Staging Area Construction	(Staging area construction costs assumed to part of OU2 construction costs)				
Soil Removal for Grading Purposes (10% of Volumes from Alternative 3)					
Soil Excavation	Hydraulic Excavator, 2 C.Y. bucket; 165 C.Y./hr	580	BCY	$1.92	$1,200
Material Transportation On-site (from excavation to staging area)	12 CY Dump truck, 0.5 mi cycle, 15 MPH ave, 15 mins. Wait/Ld/Uld	650	LCY	$3.60	$2,400
Disposal Sampling	PCBs, metals and TCLP metals analysis	1	EA	$510	$600
Transport to Disposal Facility (Non-haz)	assumes 28 tons/load transport to Chaffee Landfill in Chaffee, NY	720	Ton	$14.00	$10,100
Disposal at Disposal Facility (Non-haz)	Non-hazardous material	720	Ton	$28.00	$20,200
Transport to Disposal Facility (Haz)	assumes transport of material from Eighteenmile Creek to Model City, NY	150	Ton	$27.00	$4,100
Disposal at Disposal Facility (Haz)	Hazardous material either for PCBs or Lead	150	Ton	$181.00	$27,200

Table 2a Cost Estimate for Alternative 2a - Capping, Institutional Controls and Long Term Monitoring, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Containment (Capping)					
High Visibility Demarcation Layer		97,900	SF	$0.30	$29,400
Clean soil	Total of 2' thick over capping areas, including 6" of topsoil for planting	8,340	LCY	$27.00	$225,200
Haul Soil	12 CY dump truck, 20 miles cycle, 35 MPH ave, 15 mins Wait/Ld./Uld	8,340	LCY	$10.10	$84,300
Spread Soil	Spread dumped material, by dozer, no compaction; incl cut-back volume	8,340	LCY	$2.26	$18,900
Compact Soil	12" lifts, 2 passes, vibrating roller; incl cut-back volume	7,252	ECY	$1.17	$8,500
Finish grading, large area	Steep slopes, large quantities	98	MSF	$28.00	$2,800
Hydroseeding large areas	Mechanical Seeding, 44 lbs/MSY	10,878	SY	$0.52	$5,700
				Capital Cost Subtotal:	$796,600
				Adjusted Capital Cost Subtotal for Niagara Falls, New York Location Factor (0.991):	$789,500
				25% Legal, administrative, engineering fees, construction management:	$197,400
				25% Contingencies:	$246,800
				Capital Cost Total (in 2013 Dollars):	**$1,234,000**
Periodic Costs (Every 5 Years)					
5-yr Review, Data Evaluation, and Reporting	#REF!	80	HR	$110	$8,800
Cover Maintenance (replacing soil, demarcation layer)	Assume 5% of initial cover cost	1	LS	$18,800	$18,800
Institutional Controls	Maintain / Update Documentation	1	LS	$27,400	$27,400
				Periodic Cost Subtotal:	$55,000
				Adjusted Capital Cost Subtotal for Niagara Falls, New York Location Factor (0.991):	$54,600
				10% Legal and Administrative Fees:	$5,500
				25% Contingencies:	$15,100
				Periodic Cost Total:	**$75,200**
				30-year Present Worth of Periodic Costs (in 2013 Dollars):	**$163,000**
				2013 Total Present Worth Cost:	**$1,397,000**

Notes:

1. Assume staging area developed as part of OU2 construction will be used.
2. Estimated Volume of Hazardous Fill and Soil (143 Water St. parcel) 1,000 BCY
3. Estimated Volume of Fill and Non-Hazardous Soils (remaining parcels) 4,800 BCY

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Table 2 to 4 revised_07162013.xls-Table 2a - Alternative 2a-7/16/2013

Table 2a Cost Estimate for Alternative 2a - Capping, Institutional Controls and Long Term Monitoring, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
4. Estimated Surface Area of Hazardous Material		14,100	SF		
5. Estimated Surface Area of Non-hazardous Material and Cover Area		83,800	SF		
7. Estimated Length of Creek adjacent to properties		1,000	LF		
8. Construction Duration (Assuming 5 day work week)					
Total Project Time		3	mo	Schedule reduced from 2009	
		1	construction season		
9. Conversion from BCY to LCY (dewatered material):		1.15	LCY/BCY		
10. Conversion from BCY to tons (dewatered material):		1.5	tons/BCY		
11. Conversion from BCY to LCY (saturated material):		1.12	LCY/BCY		
12. Conversion from BCY to tons (saturated material):		1.7	tons/BCY		

13. 30-year present worth of costs assumes 7 % discount rate as per "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 540-R-00-002 August 2000).

14. Costs presented are based on conventional contracting methods.

15. Costs assume no soil removal to adjust for grading during the installation of the containment cap.

16. RS Means Historical Cost Index were used to escalate the 2008/2009 costs to 2013 costs:

Year	Index #
2007	169.4
2008	180.4
2009	180.1
2010	183.5
2011	191.2
2012	194.6
2013	197.6

Key:
BCY = Bank cubic yards.
EA = Each.
ECY = Embankment cubic yards.
HR = Hour.
kGal = Thousand gallons.
LCY = Loose cubic yards.
LF = Linear feet.
LS = Lump sum.
Mo = Month.
SF = Square feet.
SY = Square yards.
WWTP = Wastewater treatment plant.

Table 2b Cost Estimate for Alternative 2b - Capping, Institutional Controls, Long Term Monitoring and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Capital Costs					
Work Plan / Final Report	Includes submittals, meetings	1	LS	$27,400	$27,400
Institutional Controls	Environmental Easements	1	LS	$54,800	$54,800
Site Preparation and Engineering Controls					
Mobilization/Demobilization	Include site prep, trailers, staging ,etc. and demobilization.	1	LS	$54,800	$54,800
Health and Safety requirements	Officer; assume on-site 100% of project duration	65	Day	$900	$58,500
Community Air Monitoring	Particulate meters	4	Ea	$8,300	$33,200
Decontamination Pad & Containment	For equipment, personnel, and departing site vehicles	1	Setups	$3,300	$3,300
Surveying	2-person crew @ $100/hr, 8hr/day; assume 50% of project duration	33	Day	$1,800	$58,500
Traffic Control (Labor)	For roads adjacent to the residential properties, including Water St. Assume 1 person for 25% of project duration	16	Day	$700	$11,400
Remove / Relocate Existing Temporary Structures	Move sheds, pools, etc.	1	LS	$27,400	$27,400
Site Clearing					
Cut and chip heavy trees	Large trees and dense vegetation found along the creek banks; Assume 50% of entire property surface area	1	Acre	$15,400	$17,400
Grub stumps and remove - heavy	Large trees and dense vegetation found along the creek banks; Assume 50% of entire property surface area	1	Acre	$8,275	$9,300
Staging Area Construction	(Staging area construction costs assumed to part of OU2 construction costs)				
Soil Removal for Grading Purposes (10% of Volumes from Alternative 3)					
Soil Excavation	Hydraulic Excavator, 2 C.Y. bucket; 165 C.Y./hr	580	BCY	$1.92	$1,200
Material Transportation On-site (from excavation to staging area)	12 CY Dump truck, 0.5 mi cycle, 15 MPH ave, 15 mins. Wait/Ld/Uld	650	LCY	$3.60	$2,400
Disposal Sampling	PCBs, metals and TCLP metals analysis	1	EA	$510	$600
Transport to Disposal Facility (Non-haz)	assumes 28 tons/load transport to Chaffee Landfill in Chaffee, NY	720	Ton	$14.00	$10,100
Disposal at Disposal Facility (Non-haz)	Non-hazardous material	720	Ton	$28.00	$20,200
Transport to Disposal Facility (Haz)	assumes transport of material from Eighteenmile Creek to Model City, NY	150	Ton	$27.00	$4,100
Disposal at Disposal Facility (Haz)	Hazardous material either for PCBs or Lead	150	Ton	$181.00	$27,200

Table 2b Cost Estimate for Alternative 2b - Capping, Institutional Controls, Long Term Monitoring and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Containment (Capping)					
High Visibility Demarcation Layer		97,900	SF	$0.30	$29,400
Clean soil	Total of 2' thick over capping areas, including 6" of topsoil for planting	8,340	LCY	$27.00	$225,200
Haul Soil	12 CY dump truck, 20 miles cycle, 35 MPH ave, 15 mins Wait/Ld./Uld	8,340	LCY	$10.10	$84,300
Spread Soil	Spread dumped material, by dozer, no compaction; incl cut-back volume	8,340	LCY	$2.26	$18,900
Compact Soil	12" lifts, 2 passes, vibrating roller; incl cut-back volume	7,252	ECY	$1.17	$8,500
Finish grading, large area	Steep slopes, large quantities	98	MSF	$28.00	$2,800
Hydroseeding large areas	Mechanical Seeding, 44 lbs/MSY	10,878	SY	$0.52	$5,700
				Capital Cost Subtotal:	$796,600
				Adjusted Capital Cost Subtotal for Niagara Falls, New York Location Factor (0.991):	$789,500
				25% Legal, administrative, engineering fees, construction management:	$197,400
				25% Contingencies:	$246,800
				Capital Cost Total (in 2013 Dollars):	**$1,234,000**
Additional Capital Costs for Resident Relocation					
Property Acquisition					
Property Acquisition	For 5 residential properties and four vacant lots	1	LS	$170,160	$170,160
Relocation Costs for 5 residential properties					
Relocation benefits	Assume $22,500 for each of the 5 residential properties	5	EA	$22,500	$112,500
Moving Costs	Assume $6,000 for each of the 5 residential properties	5	EA	$6,000	$30,000
Utility hook-ups	Assume $500 for each of the 5 residential properties	5	EA	$500	$2,500
				Resident Relocation Subtotal:	$145,000
Corps Expenses (Acquisition and relocation of 5 residential properties and acquisition of 4 vacant lots)					
Appraisals	Assume $6,000 for contract costs and $5,000 for labor costs	1	LS	$11,000	$11,000
Title	Title costs during Preliminary, updating and closing stages. Includes $11,500 for contracts and $17,000 for labor costs	1	LS	$28,500	$28,500
Attorney Travel	Includes 5 trips for 9 closings; airfare, rental car and hotel; assume $1,000/trip	5	Trip	$1,000	$5,000

Table 2b Cost Estimate for Alternative 2b - Capping, Institutional Controls, Long Term Monitoring and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Realty specialist	Preparation of offer to sell, prepare comparable Housing Survey package, negotiations, prepare title contract and manage project. Assume $6,000 per residential property and $3,000 per vacant lot	1	LS	$42,000	$42,000
Realty Specialist Travel	Includes 5 trips for site inspections, present offers to sell and conduct comparable housing survey; Assume $1,000 per residential property	5	EA	$1,000	$5,000
Supervision		1	LS	$2,500	$2,500
Clerical		1	LS	$3,000	$3,000
Budget		1	LS	$3,000	$3,000
Transfer Property to the state		1	LS	$10,000	$10,000
Project Close-out		1	LS	$5,000	$5,000
5% Contingency		1	LS	$5,750	$5,750
M&S Fee		1	LS	$2,415	$2,415
				Corps Expense Subtotal:	$123,165
				Additional Capital Cost for Resident Relocation Total (in 2013 Dollars):	**$438,325**
Water Street Demolition Costs					
Labor for Duration of 4 Weeks					
Response Manager	Assume 1 Manager for 20 days @ 10 hours/day (8 hours regular and 2 hours Saturday/overtime) and 60 offsite hours	260	HR	$62.02	$16,125.20
Cleanup Technician	Assume 2 Technicians for 20 days @ 8 hours/day regular	320	HR	$36.93	$11,818
Cleanup Technician Saturday/Overtime	Assume 2 Technicians for 20 days @ 2 hours overtime	80	HR	$41.64	$3,331
Equipment Operator	Assume 1 Operator for 20 days @ 8 hours/day regular	160	HR	$58.82	$9,411
Equipment Operator Saturday/Overtime	Assume 1 Operator for 20 days @ 2 hours overtime	40	HR	$64.45	$2,578
Field Accountant	Assume 1 Accountant for 20 days @ 8 hours/day regular and 25 hours offsite hours	185	HR	$38.43	$7,110
Field Accountant Saturday/Overtime	Assume 1 Accountant for 20 days @ 2 hours overtime	40	HR	$52.68	$2,107
T&D Coordinator	Assume 1 coordinator for 10 offsite hours	10	HR	$55.44	$554
IH-Safety	Assume 1 safety coordinator for 10 offsite hours	10	HR	$42.63	$426
				Labor Subtotal:	$53,461

Table 2b Cost Estimate for Alternative 2b - Capping, Institutional Controls, Long Term Monitoring and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Equipment for Duration of 4 Weeks					
Pick up Truck	Assume 3 trucks will be rented for 20 days	60	Days	$37.10	$2,226
Computer	Assume 2 computers will be rented for 20 days	40	Days	$7.43	$297
Printers	Assume 2 Printers will be rented for 20 days	40	Days	$0.10	$4
Cell Phones	Assume 2 Cell Phones will be rented for 20 days	40	Days	$0.10	$4
				Equipment Subtotal:	$2,531
ODCs					
Hotel	Includes weekends	140	Days	$77.00	$10,780
Per Diem	Includes weekends	140	Days	$51.00	$7,140
Personnel Mobilization	Mobilization for 5 people; Assume $400/person	5	EA	$400.00	$2,000
Personnel Demobilization	Demobilization for 5 people; Assume $400/person	5	EA	$400.00	$2,000
Project Support Facilities	Assume project support facilities will be needed for one	1	Mo	$2,250.00	$2,250
Site Security	Assume site security needed for 118 hours/week	472	HR	$25.00	$11,800
Asbestos/Lead Survey	Assume Asbestos surveys will be needed for each of the 5 hours	5	EA	$1,500.00	$7,500
Asbestos Abatement Contingency	Assume that abatement activities might be necessary at one or more homes. A contingency of $30,000 has been added.	1	LS	$30,000.00	$30,000
Excavator with grapple	Assume excavator will be needed for one month	1	Mo	$7,000.00	$7,000
Skid Steer Loader	Assume loader will be needed for one month	1	Mo	$2,500.00	$2,500
Mason Dump	Assume mason dump will be needed for one month	1	Mo	$2,500.00	$2,500
Chipper	Assume chipper will be needed for one month	1	Mo	$2,500.00	$2,500
Backfill	For filling in excavated areas	961	Tons	$15.00	$14,415
Top Soil	For filling in excavated areas	144	Tons	$22.00	$3,168
Hydroseeding		7,090	SF	$0.16	$1,134
Fence Installation plus gate	Assume $1500 for gate	900	LF	$20.00	$19,500
Diesel Fuel		4	Weeks	$500.00	$2,000
C&D debris T&D		640	Tons	$48.00	$30,720
Debris Analytical		1	LS	$1,500.00	$1,500
Other ODCs		1	LS	$10,000.00	$10,000

Table 2b Cost Estimate for Alternative 2b - Capping, Institutional Controls, Long Term Monitoring and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
				ODCs Subtotal:	$170,407
				G&A	$10,055
				Total Cleanup Contractor Cost Subtotal:	$236,454
				Remedial Support Team 2:	$49,000
				Subtotal ExtraMural Costs:	$285,454
				Extramural Cost Contingency (20%):	$57,091
				Total Project Ceiling (in 2013 Dollars):	**$342,545**
Periodic Costs (Every 5 Years)					
5-yr Review, Data Evaluation, and Reporting		80	HR	$110	$8,800
Cover Maintenance (replacing soil, demarcation layer)	Assume 5% of initial cover cost	1	LS	$18,800	$18,800
Institutional Controls	Maintain / Update Documentation	1	LS	$27,400	$27,400
				Periodic Cost Subtotal:	$55,000
				Adjusted Capital Cost Subtotal for Niagara Falls, New York Location Factor (0.991):	$54,600
				10% Legal and Administrative Fees:	$5,500
				25% Contingencies:	$15,100
				Periodic Cost Total:	**$75,200**
				30-year Present Worth of Periodic Costs (in 2013 Dollars):	**$163,000**
				2013 Total Present Worth Cost:	**$2,177,870**

Notes:

1. Assume staging area developed as part of OU2 construction will be used.		
2. Estimated Volume of Hazardous Fill and Soil (143 Water St. parcel)	1,000	BCY
3. Estimated Volume of Fill and Non-Hazardous Soils (remaining parcels)	4,800	BCY
4. Estimated Surface Area of Hazardous Material	14,100	SF
5. Estimated Surface Area of Non-hazardous Material and Cover Area	83,800	SF
7. Estimated Length of Creek adjacent to properties	1,000	LF
8. Construction Duration (Assuming 5 day work week)		
Assume Mob/Demob Time	2	mo / construction season
Max Excavation Rate	165	CY/hr
Assumed Effective Production Rate	75	%
Effective Excavation Rate	1,238	CY/day

Table 2b Cost Estimate for Alternative 2b - Capping, Institutional Controls, Long Term Monitoring and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
		6,188	CY/ week		
		24,750	CY/mo		
Disposal Rate; Assume 15 trucks / day, 28 tons per truck		420	tons/day		
		2,100	tons/week		
		8,400	tons/mo		
Time based on excavation/backfill		0.04	mo		
Time based on disposal		0.18	mo		
Excavation, backfill, disposal, and cover		2	mo		
Mob/ Demob Time		2	mo		
Bank Stabilization/Site Restoration Time		2	mo		
Total Project Time		3	mo	Schedule reduced from 2009	
		1	construction season		

9. Conversion from BCY to LCY (dewatered material): 1.15 LCY/BCY
10. Conversion from BCY to tons (dewatered material): 1.5 tons/BCY
11. Conversion from BCY to LCY (saturated material): 1.12 LCY/BCY
12. Conversion from BCY to tons (saturated material): 1.7 tons/BCY
13. 30-year present worth of costs assumes 7 % discount rate as per "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 540-R-00-002 August 2000).
14. Costs presented are based on conventional contracting methods.
15. Costs assume no soil removal to adjust for grading during the installation of the containment cap.
16. RS Means Historical Cost Index were used to escalate the 2008/2009 costs to 2013 costs:

Year	Index #
2007	169.4
2008	180.4
2009	180.1
2010	183.5
2011	191.2
2012	194.6
2013	197.6

Key:
BCY = Bank cubic yards.
EA = Each.
ECY = Embankment cubic yards.
HR = Hour.
kGal = Thousand gallons.
LCY = Loose cubic yards.
LF = Linear feet.
LS = Lump sum.
Mo = Month.
SF = Square feet.
SY = Square yards.
WWTP = Wastewater treatment plant.

Table 3a Cost Estimate for Alternative 3a - Complete Excavation and Off-site Disposal, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Capital Costs					
Work Plan / Final Report	Includes submittals, meetings	1	LS	$27,400	$27,400
Site Preparation and Engineering Controls					
Mobilization/Demobilization	Include site prep, trailers, staging ,etc. and demobilization. Assume 2.5 % of overall capital costs	1	LS	$57,500	$57,500
Health and Safety requirements	Officer; assume on-site 100% of project duration	130	Day	$900	$117,000
Community Air Monitoring	Particulate meters	4	Ea	$8,300	$33,200
Decontamination Pad & Containment	For equipment, personnel, and departing site vehicles	1	Setups	$3,300	$3,300
Surveying	2-person crew @ $100/hr, 8hr/day; assume 50% of project duration	65	Day	$1,800	$117,000
Traffic Control (Labor)	For roads adjacent to the residential properties, including Water St. Assume 1 person for 25% of project duration	33	Day	$700	$22,800
Site Clearing					
Cut and chip heavy trees	Large trees and dense vegetation found along the creek banks; Assume 50% of entire property surface area	1	Acre	$15,400	$17,400
Grub stumps and remove - heavy	Large trees and dense vegetation found along the creek banks; Assume 50% of entire property surface area	1	Acre	$8,275	$9,300
Remove / Relocate Existing Temporary Structures	Sheds, pools, etc.	1	LS	$27,400	$27,400
Staging Area Construction	(Staging area construction costs assumed to part of OU2 construction costs)				
Soil Removal					
Soil Excavation	Hydraulic Excavator, 2 C.Y. bucket; 165 C.Y./hr	5,800	BCY	$1.92	$11,200
Material Transportation On-site (from excavation to staging area)	12 CY Dump truck, 0.5 mi cycle, 15 MPH ave, 15 mins. Wait/Ld/Uld	6,670	LCY	$3.60	$24,100
Verification Sampling	PCBs and metals analysis, assumes 24-hr turnaround (markup of 200%)	157	EA	$300	$47,000
Disposal Sampling	PCBs, metals and TCLP metals analysis	10	EA	$510	$5,100
Transport to Disposal Facility (Non-haz)	assumes 28 tons/load transport to Chaffee Landfill in Chaffee, NY	7,200	Ton	$14.00	$100,800
Disposal at Disposal Facility (Non-haz)	Non-hazardous material	7,200	Ton	$28.00	$201,600
Transport to Disposal Facility (Haz)	assumes transport of material from Eighteenmile Creek to Model City, NY	1,500	Ton	$27.00	$40,500
Disposal at Disposal Facility (Haz)	Hazardous material either for PCBs or Lead	1,500	Ton	$181	$271,500

Table 3a Cost Estimate for Alternative 3a - Complete Excavation and Off-site Disposal, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Backfill and Site Restoration (of Excavated Areas)					
Fill	Select Fill for shoulders and embankments; Material incl. 6" of top soil at surface	6,670	LCY	$27.00	$180,100
Haul Fill	12 CY dump truck, 20 miles cycle, 35 MPH ave, 15 mins Wait/Ld./Uld	6,670	LCY	$10.10	$67,400
Spread Fill	Spread dumped material, by dozer, no compaction; incl cut-back volume	6,670	LCY	$2.26	$15,100
Compact Fill	12" lifts, 2 passes, vibrating roller; incl cut-back volume	5,800	ECY	$1.17	$6,800
Finish grading, large area	Steep slopes, large quantities	98	MSF	$28.00	$2,800
Hydroseeding large areas	Mechanical Seeding, 44 lbs/MSY	10,878	SY	$0.52	$5,700
Plantings (Trees)	Assume Norway Maple is representative (Based on SRI); 1-1/2" to 2" Cal; 25% of excavated areas	39	Ea	$220	$8,700
Replace / Relocate Existing Temporary Structures		1	LS	$27,400	$27,400
				Capital Cost Subtotal:	$1,448,100
				Adjusted Capital Cost Subtotal for Niagara Falls, New York Location Factor (0.991):	$1,435,067
				25% Legal, administrative, engineering fees, construction management:	$358,800
				25% Contingencies:	$448,500
				Capital Cost Total (in 2013 Dollars):	**$2,243,000**
				2013 Total Present Worth Cost:	**$2,243,000**

Notes:

1. Assume staging area developed as part of OU2 construction will be used.		
2. Estimated Volume of Hazardous Fill and Soil (143 Water St. parcel)	1,000	BCY
3. Estimated Volume of Fill and Non-Hazardous Soils (remaining parcels)	4,800	BCY
4. Estimated Surface Area of Hazardous Material (estimated based on extent of contamination shown on Figure 4-1)	14,100	SF
5. Estimated Surface Area of Non-hazardous Material (estimated based on extent of contamination shown on Figure 4-1)	83,800	SF
6. Estimated Length of Creek adjacent to properties	1,000	LF
7. Assume verification sampling grid spacing:	25	ft
8. Construction Duration (Assuming 5 day work week)		
Total Project Time	6	mo Not adjusted from 2009 Estimate
	1	construction season
9. Conversion from BCY to LCY (dewatered material):	1.15	LCY/BCY
10. Conversion from BCY to tons (dewatered material):	1.5	tons/BCY
11. Conversion from BCY to LCY (saturated material):	1.12	LCY/BCY

Table 3a Cost Estimate for Alternative 3a - Complete Excavation and Off-site Disposal, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost

12. Conversion from BCY to tons (saturated material): 1.7 tons/BCY

13. 30-year present worth of costs assumes 7 % discount rate as per "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 540-R-00-002 August 2000).

14. Costs presented are based on conventional contracting methods.

15. Assume tree planting grid spacing every 25 ft

16. RS Means Historical Cost Index were used to escalate the 2008/2009 costs to 2013 costs:

Year	Index #
2007	169.4
2008	180.4
2009	180.1
2010	183.5
2011	191.2
2012	194.6
2013	197.6

Key:

BCY = Bank cubic yards.

EA = Each.

ECY = Embankment cubic yards.

HR = Hour.

kGal = Thousand gallons.

LCY = Loose cubic yards.

LF = Linear feet.

LS = Lump sum.

Mo = Month.

MSF = 1000 square feet.

OU = Operable Unit.

SF = Square feet.

SY = Square yards.

WWTP = Wastewater treatment plant.

Table 3b Cost Estimate for Alternative 3 - Complete Excavation, Off-site Disposal and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Capital Costs					
Work Plan / Final Report	Includes submittals, meetings	1	LS	$27,400	$27,400
Site Preparation and Engineering Controls					
Mobilization/Demobilization	Include site prep, trailers, staging ,etc. and demobilization. Assume 2.5 % of overall capital costs	1	LS	$57,500	$57,500
Health and Safety requirements	Officer; assume on-site 100% of project duration	130	Day	$900	$117,000
Community Air Monitoring	Particulate meters	4	Ea	$8,300	$33,200
Decontamination Pad & Containment	For equipment, personnel, and departing site vehicles	1	Setups	$3,300	$3,300
Surveying	2-person crew @ $100/hr, 8hr/day; assume 50% of project duration	65	Day	$1,800	$117,000
Traffic Control (Labor)	For roads adjacent to the residential properties, including Water St. Assume 1 person for 25% of project duration	33	Day	$700	$22,800
Site Clearing					
Cut and chip heavy trees	Large trees and dense vegetation found along the creek banks; Assume 50% of entire property surface area	1	Acre	$15,400	$17,400
Grub stumps and remove - heavy	Large trees and dense vegetation found along the creek banks; Assume 50% of entire property surface area	1	Acre	$8,275	$9,300
Remove / Relocate Existing Temporary Structures	Sheds, pools, etc.	1	LS	$27,400	$27,400
Staging Area Construction	(Staging area construction costs assumed to part of OU2 construction costs)				
Soil Removal					
Soil Excavation	Hydraulic Excavator, 2 C.Y. bucket; 165 C.Y./hr	5,800	BCY	$1.92	$11,200
Material Transportation On-site (from excavation to staging area)	12 CY Dump truck, 0.5 mi cycle, 15 MPH ave, 15 mins. Wait/Ld/Uld	6,670	LCY	$3.60	$24,100
Verification Sampling	PCBs and metals analysis, assumes 24-hr turnaround (markup of 200%)	157	EA	$300	$47,000
Disposal Sampling	PCBs, metals and TCLP metals analysis	10	EA	$510	$5,100
Transport to Disposal Facility (Non-haz)	assumes 28 tons/load transport to Chaffee Landfill in Chaffee, NY	7,200	Ton	$14.00	$100,800
Disposal at Disposal Facility (Non-haz)	Non-hazardous material	7,200	Ton	$28.00	$201,600
Transport to Disposal Facility (Haz)	assumes transport of material from Eighteenmile Creek to Model City, NY	1,500	Ton	$27.00	$40,500
Disposal at Disposal Facility (Haz)	Hazardous material either for PCBs or Lead	1,500	Ton	$181	$271,500

Table 3b Cost Estimate for Alternative 3 - Complete Excavation, Off-site Disposal and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Backfill and Site Restoration (of Excavated Areas)					
Fill	Select Fill for shoulders and embankments; Material incl. 6" of top soil at surface	6,670	LCY	$27.00	$180,100
Haul Fill	12 CY dump truck, 20 miles cycle, 35 MPH ave, 15 mins Wait/Ld./Uld	6,670	LCY	$10.10	$67,400
Spread Fill	Spread dumped material, by dozer, no compaction; incl cut-back volume	6,670	LCY	$2.26	$15,100
Compact Fill	12" lifts, 2 passes, vibrating roller; incl cut-back volume	5,800	ECY	$1.17	$6,800
Finish grading, large area	Steep slopes, large quantities	98	MSF	$28.00	$2,800
Hydroseeding large areas	Mechanical Seeding, 44 lbs/MSY	10,878	SY	$0.52	$5,700
Plantings (Trees)	Assume Norway Maple is representative (Based on SRI); 1-1/2" to 2" Cal; 25% of excavated areas	39	Ea	$220	$8,700
Replace / Relocate Existing Temporary Structures		1	LS	$27,400	$27,400
				Capital Cost Subtotal:	$1,448,100
				Adjusted Capital Cost Subtotal for Niagara Falls, New York Location Factor (0.991):	$1,435,067
				25% Legal, administrative, engineering fees, construction management:	$358,800
				25% Contingencies:	$448,500
				Capital Cost Total (in 2013 Dollars):	**$2,243,000**
Additional Capital Costs for Resident Relocation					
Property Acquisition					
Property Acquisition	For 5 residential properties and four vacant lots	1	LS	$170,160	$170,160
Relocation Costs for 5 residential properties					
Relocation benefits	Assume $22,500 for each of the 5 residential properties	5	EA	$22,500	$112,500
Moving Costs	Assume $6,000 for each of the 5 residential properties	5	EA	$6,000	$30,000
Utility hook-ups	Assume $500 for each of the 5 residential properties	5	EA	$500	$2,500
				Resident Relocation Subtotal:	$145,000
Corps Expenses (Acquisition and relocation of 5 residential properties and acquisition of 4 vacant lots)					
Appraisals	Assume $6,000 for contract costs and $5,000 for labor costs	1	LS	$11,000	$11,000
Title	Title costs during Preliminary, updating and closing stages. Includes $11,500 for contracts and $17,000 for labor costs	1	LS	$28,500	$28,500
Attorney Travel	Includes 5 trips for 9 closings; airfare, rental car and hotel; assume $1,000/trip	5	Trip	$1,000	$5,000

Table 3b Cost Estimate for Alternative 3 - Complete Excavation, Off-site Disposal and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Realty specialist	Preparation of offer to sell, prepare comparable Housing Survey package, negotiations, prepare title contract and manage project. Assume $6,000 per residential property and $3,000 per vacant lot	1	LS	$42,000	$42,000
Realty Specialist Travel	Includes 5 trips for site inspections, present offers to sell and conduct comparable housing survey; Assume $1,000 per residential property	5	EA	$1,000	$5,000
Supervision		1	LS	$2,500	$2,500
Clerical		1	LS	$3,000	$3,000
Budget		1	LS	$3,000	$3,000
Transfer Property to the state		1	LS	$10,000	$10,000
Project Close-out		1	LS	$5,000	$5,000
5% Contingency		1	LS	$5,750	$5,750
M&S Fee		1	LS	$2,415	$2,415
				Corps Expense Subtotal:	$123,165
				Additional Capital Cost for Resident Relocation Total (in 2013 Dollars):	**$438,325**
Water Street Demolition Costs					
Labor for Duration of 4 Weeks					
Response Manager	Assume 1 Manager for 20 days @ 10 hours/day (8 hours regular and 2 hours Saturday/overtime) and 60 offsite hours	260	HR	$62.02	$16,125.20
Cleanup Technician	Assume 2 Technicians for 20 days @ 8 hours/day regular	320	HR	$36.93	$11,818
Cleanup Technician Saturday/Overtime	Assume 2 Technicians for 20 days @ 2 hours overtime	80	HR	$41.64	$3,331
Equipment Operator	Assume 1 Operator for 20 days @ 8 hours/day regular	160	HR	$58.82	$9,411
Equipment Operator Saturday/Overtime	Assume 1 Operator for 20 days @ 2 hours overtime	40	HR	$64.45	$2,578
Field Accountant	Assume 1 Accountant for 20 days @ 8 hours/day regular and 25 hours offsite hours	185	HR	$38.43	$7,110
Field Accountant Saturday/Overtime	Assume 1 Accountant for 20 days @ 2 hours overtime	40	HR	$52.68	$2,107
T&D Coordinator	Assume 1 coordinator for 10 offsite hours	10	HR	$55.44	$554
IH-Safety	Assume 1 safety coordinator for 10 offsite hours	10	HR	$42.63	$426
				Labor Subtotal:	$53,461

Table 3b Cost Estimate for Alternative 3 - Complete Excavation, Off-site Disposal and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Equipment for Duration of 4 Weeks					
Pick up Truck	Assume 3 trucks will be rented for 20 days	60	Days	$37.10	$2,226
Computer	Assume 2 computers will be rented for 20 days	40	Days	$7.43	$297
Printers	Assume 2 Printers will be rented for 20 days	40	Days	$0.10	$4
Cell Phones	Assume 2 Cell Phones will be rented for 20 days	40	Days	$0.10	$4
				Equipment Subtotal:	$2,531
ODCs					
Hotel	Includes weekends	140	Days	$77.00	$10,780
Per Diem	Includes weekends	140	Days	$51.00	$7,140
Personnel Mobilization	Mobilization for 5 people; Assume $400/person	5	EA	$400.00	$2,000
Personnel Demobilization	Demobilization for 5 people; Assume $400/person	5	EA	$400.00	$2,000
Project Support Facilities	Assume project support facilities will be needed for one month	1	Mo	$2,250.00	$2,250
Site Security	Assume site security needed for 118 hours/week	472	HR	$25.00	$11,800
Asbestos/Lead Survey	Assume Asbestos surveys will be needed for each of the 5 hours	5	EA	$1,500.00	$7,500
Asbestos Abatement Contingency	Assume that abatement activities might be necessary at one or more homes. A contingency of $30,000 has been added.	1	LS	$30,000.00	$30,000
Excavator with grapple	Assume excavator will be needed for one month	1	Mo	$7,000.00	$7,000
Skid Steer Loader	Assume loader will be needed for one month	1	Mo	$2,500.00	$2,500
Mason Dump	Assume mason dump will be needed for one month	1	Mo	$2,500.00	$2,500
Chipper	Assume chipper will be needed for one month	1	Mo	$2,500.00	$2,500
Backfill	For filling in excavated areas	961	Tons	$15.00	$14,415
Top Soil	For filling in excavated areas	144	Tons	$22.00	$3,168
Hydroseeding		7,090	SF	$0.16	$1,134
Fence Installation plus gate	Assume $1500 for gate	900	LF	$20.00	$19,500
Diesel Fuel		4	Weeks	$500.00	$2,000
C&D debris T&D		640	Tons	$48.00	$30,720
Debris Analytical		1	LS	$1,500.00	$1,500
Other ODCs		1	LS	$10,000.00	$10,000

Table 3b Cost Estimate for Alternative 3 - Complete Excavation, Off-site Disposal and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
				ODCs Subtotal:	$170,407
				G&A	$10,055
				Total Cleanup Contractor Cost Subtotal:	$236,454
				Remedial Support Team 2:	$49,000
				Subtotal ExtraMural Costs:	$285,454
				Extramural Cost Contingency (20%):	$57,091
				Total Project Ceiling (in 2013 Dollars):	**$342,545**
				2013 Total Present Worth Cost:	**$3,023,870**

Notes:

1. Assume staging area developed as part of OU2 construction will be used.			
2. Estimated Volume of Hazardous Fill and Soil (143 Water St. parcel)	1,000	BCY	
3. Estimated Volume of Fill and Non-Hazardous Soils (remaining parcels)	4,800	BCY	
4. Estimated Surface Area of Hazardous Material (estimated based on extent of contamination shown	14,100	SF	
5. Estimated Surface Area of Non-hazardous Material (estimated based on extent of contamination shown on Figure 4-1)	83,800	SF	
6. Estimated Length of Creek adjacent to properties	1,000	LF	
7. Assume verification sampling grid spacing:	25	ft	
8. Construction Duration (Assuming 5 day work week)			
Total Project Time	6	mo	Not adjusted from 2009 Estimate
	1	construction season	
material):	1.15	LCY/BCY	
material):	1.5	tons/BCY	
material):	1.12	LCY/BCY	
material):	1.7	tons/BCY	

13. 30-year present worth of costs assumes 7 % discount rate as per "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 540-R-00-002 August 2000).

14. Costs presented are based on conventional contracting methods.

15. Assume tree planting grid spacing every 25 ft

16. RS Means Historical Cost Index were used to escalate the 2008/2009 costs to 2013 costs:

Year	Index #
2007	169.4
2008	180.4
2009	180.1
2010	183.5
2011	191.2

Table 3b Cost Estimate for Alternative 3 - Complete Excavation, Off-site Disposal and Permanent Relocation, Eighteenmile Creek Corridor Site, Lockport, New York

Description	Comments	Quantity	Units	Unit Cost	Cost
Key:		2012	194.6		
BCY = Bank cubic yards.		2013	197.6		
EA = Each.					
ECY = Embankment cubic yards.					
HR = Hour.					
kGal = Thousand gallons.					
LCY = Loose cubic yards.					
LF = Linear feet.					
LS = Lump sum.					
Mo = Month.					
MSF = 1000 square feet.					
OU = Operable Unit.					
SF = Square feet.					
SY = Square yards.					
WWTP = Wastewater treatment plant.					

Table 4 Summary of Total Present Worth Values of Alternatives, Eighteenmile Creek Corridor Site, Lockport, New York

	Alternative 1	Alternative 2a	Alternative 2b	Alternative 3a	Alternative 3b
Description	No Action	Capping, Institutional Controls and Long Term Monitoring	Capping, Institutional Controls, Long Term Monitoring and Permanent Relocation	Complete Excavation and Offsite Disposal	Complete Excavation, Offsite Disposal and Permanent Relocation
Total Project Duration (Years)	0	30	30	30	30
Capital Cost	$0	$1,234,000	$1,234,000	$2,243,000	$2,243,000
Additional Capital Costs for Resident Relocation	$0	$0	$438,325	$0	$438,325
Water Street Demolition Costs	$0	$0	$342,545	$0	$342,545
30-year Present Worth of Periodic O&M Costs:	$0	$163,000	$163,000	$0	$0
2013 Total Present Value of Alternatives:	**$0**	**$1,397,000**	**$2,177,870**	**$2,243,000**	**$3,023,870**

Note:
All costs are presented in 2013 Dollars.