Prepared for:
HRP Potomac, LLC
c/o Hilco Redevelopment Partners
Alexandria, Virginia

Prepared By:
Ramboll Americas Engineering Solutions, Inc.
Arlington, Virginia

Date:
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Project Number:
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PERIMETER DUST MONITORING PLAN (DMP)

1400 NORTH ROYAL STREET, ALEXANDRIA, VIRGINIA

Bright ideas.
Sustainable change.

PERIMETER DUST MONITORING PLAN (DMP)
1400 NORTH ROYAL STREET, ALEXANDRIA, VIRGINIA

Project name	**HRP_PRGS DMP**
Recipient	**HRP Potomac LLC**
Document type	**Perimeter Dust Monitoring Plan**
Version	**001**
Date	**February 13, 2024**
Prepared by	**McNeill Bauer, Kim Groff**
Checked by	**Sarah Ostertag**
Approved by	**Sarah Stoneking**
Description	**Perimeter Dust Monitoring Plan for 1400 North Royal Street, Alexandria, Virginia**

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1. INTRODUCTION

Ramboll Americas Engineering Solutions, Inc. (Ramboll) was retained by HRP Potomac, LLC (HRP Potomac) to prepare a perimeter dust monitoring plan for 1400 North Royal Street in Alexandria, Virginia (the "Site"). The Site is the location of the former Potomac River Generating Station (PRGS). The goal of this Perimeter Dust Monitoring Plan (DMP) is to provide a framework for a dust monitoring program that will be implemented during deconstruction and redevelopment of the Site. The program will document baseline and real-time conditions, in support of the future deconstruction and construction activities. A Site Location map is included as Figure 1.

During the implementation of the DMP, measures will be taken by the deconstruction and project construction teams to identify likely potential sources of fugitive dust emissions and provide effective and timely dust mitigation measures to minimize fugitive dust emissions at the Site.

The objectives of the dust monitoring program include the following:

- Develop a conservative project action level for site perimeter dust levels that is protective of human health;
- Establish a monitoring program that provides real-time notifications if dust levels begin to increase during the work;
- Summarize protocols to be followed if dust levels begin to approach the project action levels; and
- Establish recordkeeping and reporting.

Implementation of this DMP will be performed in conjunction with the Site Soil and Groundwater Management Plan (SGMP) prepared by Ramboll.

2. SITE DESCRIPTION

2.1 Site Location and Use

The Site consists of approximately 18.8 acres of land located at 1400 North Royal Street in Alexandria, Virginia at the intersection of Bashford Lane and North Royal Street (**Figure 1**).

The Site features include an unused and unoccupied multi-story main power plant building constructed with a basement, a covered utility corridor, and five coal-fired steam boilers and turbine generators. Supporting features include air emissions equipment, a former unlined coal pile area, a clay-lined sediment basin, a rail yard, water treatment facilities, one bottom ash and two fly ash silos, administration offices, an analytical laboratory, and storage facilities and ancillary buildings, which include maintenance areas – all supporting features are out of service.

HRP Potomac plans to redevelop the property as mixed-use development, including both commercial and residential uses. The former PRGS is no longer operating and existing site structures will be deconstructed in coordination with redevelopment of the site. Current site use is limited to routine property maintenance and assessment activities.

2.2 Surrounding Area Use

The site is located in a mixed residential and commercial land use area. The Site is bounded to the south by an inactive railroad spur followed by residential and commercial development, to the west by a Potomac Electric Power Company (Pepco) switchyard and parking lot followed by East Abingdon Drive and the George Washington Memorial Parkway, to the north by Slaters Lane and a condominium building, and to the east by the National Park Service's (NPS) Mount Vernon Trail followed by the Potomac River.

3. DUST ACTION LEVELS

To ensure residents near the site are not exposed to unacceptable levels of contamination through windblown dust inhalation, Ramboll calculated a site-specific risk-based screening level (RBSL) for dust that could be generated from site soil and blown towards nearby residents during on-site construction, assuming a child could be present immediately adjacent to the Site during earthwork. The age 0 to 2 years child receptor was assumed to be present 8 hours per day, 5 days per week, for 2 years. Ramboll used the 95% upper confidence limit on the mean (UCL) concentrations for constituents detected in surface and subsurface soil samples collected recently at the Site to model contaminant concentrations in airborne dust. These calculations are provided in **Appendix A**. The 24-hour National Ambient Air Quality Standard (NAAQS) of 150 $\mu g/m^3$ for PM_{10} is used as the dust action level. If the average PM_{10} concentration is below this level for the assumed duration of construction, nearby residents would not be expected to be exposed to unacceptable risks from this dust.

4. PERIMETER DUST MONITORING

Real-time perimeter dust monitoring will be conducted during deconstruction and earthwork activities. The monitoring program will utilize industry standard and quality assured monitoring methodologies (e.g., Met One E-Sampler, Aeroqual Sentry PM_{10} real-time monitor, or equivalent) to provide full-time remote dust monitoring. The real-time dust monitoring data will be equipped with telemetry and data logging capabilities. The dust monitors will be stored in weatherproof stations on tripods and will be equipped with solar panels and batteries.

Six (6) dust monitors will be deployed around the perimeter of the Site in the approximate locations shown on **Figure 2**. The proposed locations of the monitoring stations are approximate and may be adjusted if needed as the work progresses.

The stationed dust meters will collect dust readings continuously during deconstruction and construction activities that are likely to produce dust, and the monitors will report out 15-minute time-weighted averages throughout the workday. The monitors will be programmed to provide notification to Ramboll and HRP Potomac when the dust level of 150 $\mu g/m^3$ is exceeded for any 15-minute time-weighted average. In the case of an exceedance of the dust level for a 15-minute period, corrective actions will be taken to mitigate dust generation as described in Section 5.

5. CORRECTIVE ACTIONS

If 15-min time-weighted average dust levels are sustained above 150 µg/m^3, Ramboll will notify HRP Potomac who will notify the contractors working onsite. Dust mitigation control measures will then be adjusted by the deconstruction and project construction teams in accordance with the SGMP. The 15-min time-weighted average notification will allow for identification of situations when adjustments to dust mitigation measures are needed to ensure that the 24-hr time-weighted action level for the project is not exceeded.

Corrective measures may include, but are not limited to, increasing the frequency of dust control measures, modifying dust control procedures, changing material management removal procedures, and/or choosing alternate construction equipment or methods. Pending implementation of corrective actions, Ramboll will monitor perimeter air monitoring levels to determine if the selected corrective actions were effective.

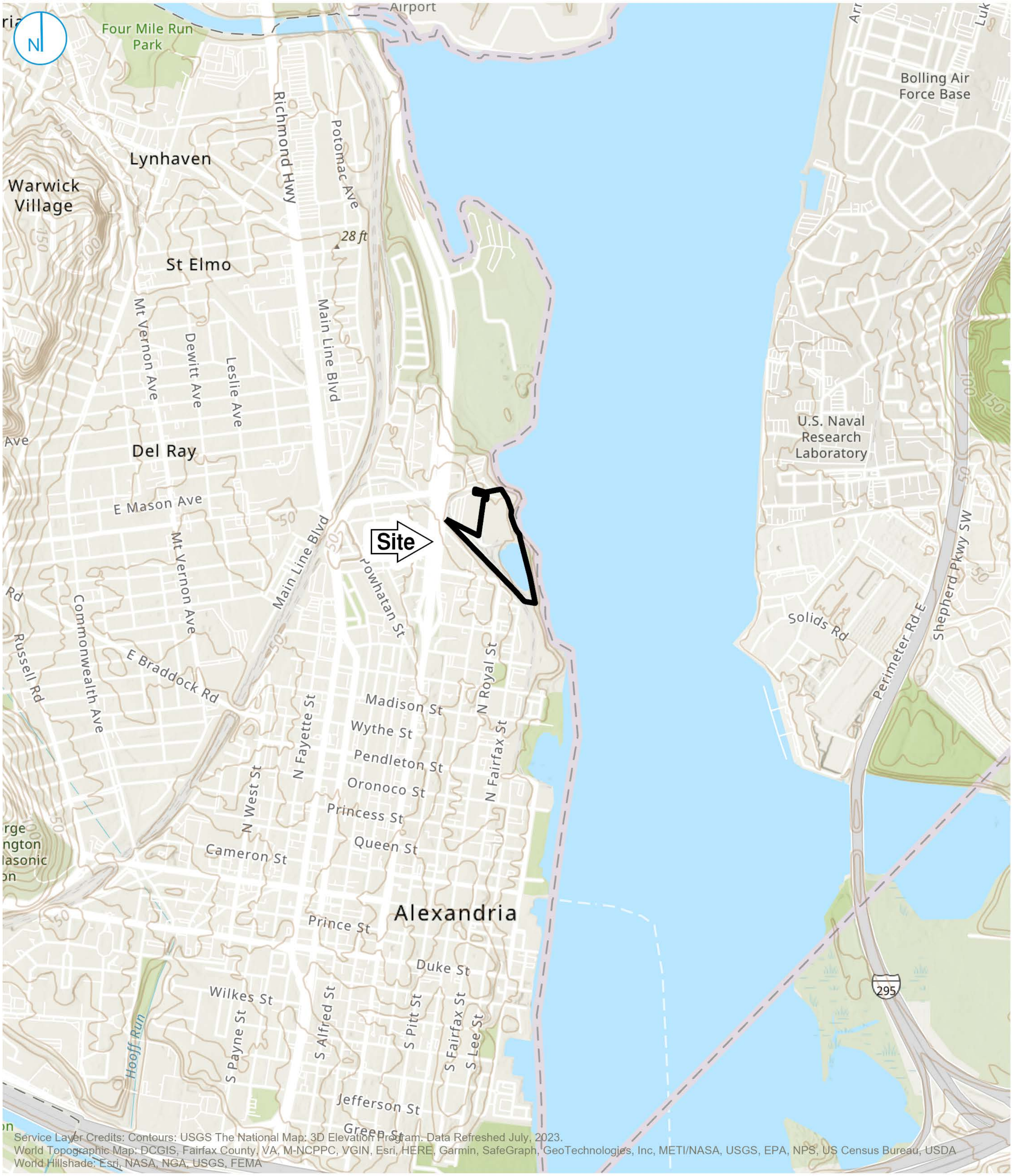
6. RECORDKEEPING AND REPORTING

Monthly reports summarizing the prior month’s dust monitoring results and corrective actions (if any), will be prepared. Monthly dust monitoring reports will be uploaded to the project website for review by the public.

FIGURES

PROJECT: 1690022371 | DATED: 10/4/2023 | DESIGNER: MBAUER

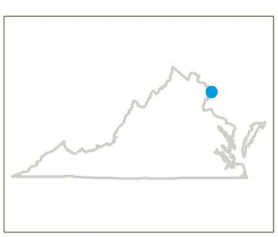
C:\Users\MBAUER\Documents\GIS\HRP PRGS Alexandria Power Plant Redevelopment Project Package.aprx\1_Ramboll_SiteLocationMap



Map Scale: 1:24,000 | Map Center: 77°2'26"W 38°49'4"N

SITE LOCATION MAP

FIGURE 01



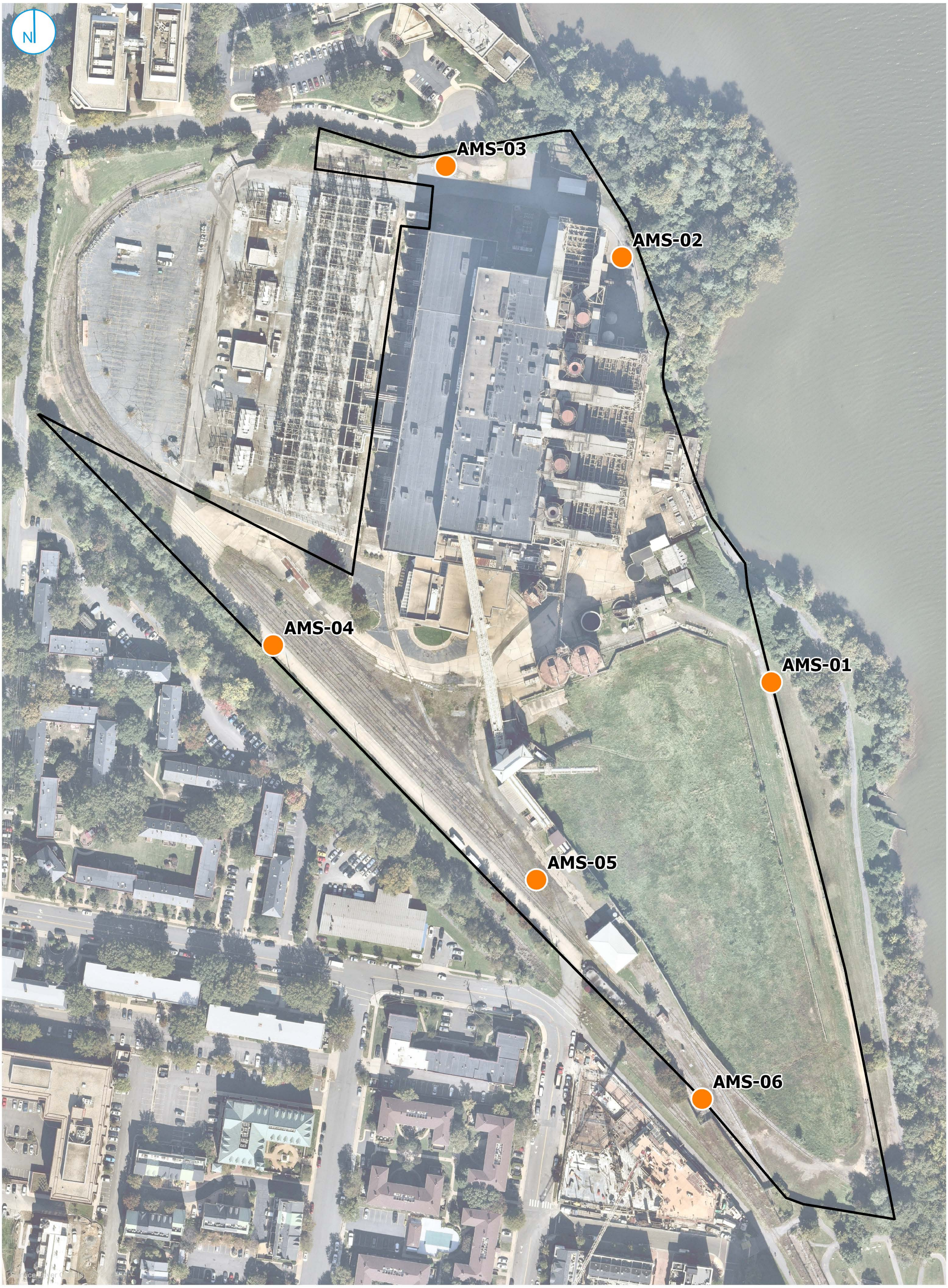
KEY MAP (not to scale)

0 500 1,000 Feet

Former Potomac River Generating Station
1400 North Royal Street
Alexandria, Virginia 22314

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL



Air Monitoring Station (AMS)

Property Boundary

Note: The proposed locations of the monitoring stations are approximate and may be adjusted if needed as the work progresses.

0 100 200 Feet

PROPOSED AIR MONITORING STATIONS

FIGURE 2

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

Former Potomac River Generating Station
1400 North Royal Street
Alexandria, VA 22314

RAMBOLL

APPENDIX A
PARTICULATE RISK BASED SCREENING LEVELS

TECHNICAL APPENDIX:

To ensure residents near the site are not exposed to unacceptable levels of contamination through windblown dust inhalation during construction, a site-specific risk-based screening level (RBSL) for dust that could be generated from site soil and blown towards nearby residents during on-site construction activities was calculated. Because there are multiple contaminants contributing to the risk estimates, it is more appropriate to evaluate the risk as cumulative cancer risk and noncancer hazard index (HI) rather than calculating screening levels for individual chemicals. Therefore, the dust RBSL is based on the average contaminant concentrations in on-site soil, as represented by the 95% upper confidence limit on the mean (UCL); these concentrations were used to estimate the highest concentration of dust in the air that would represent acceptable risks (i.e., a cumulative cancer risk and HI below USEPA and VDEQ limits) to nearby residents.

The site-specific RBSL is function of site-specific resident exposure factors (**Table 1**) and chemical specific toxicity values (**Table 2**). These calculations conservatively assume a child resident receptor (age 0-2).

Table 1: Outdoor Air Inhalation of Soil Vapor and/or Particulates for a Child Resident Near Construction			
Variable		**Value**	**Notes**
Exposure Time (h/d)	ET	8	a
Exposure Frequency (d/yr)	EF	250	b
Exposure Duration (yr)	ED	2	c
Averaging Time, carc (h)	AT_c	613,200	d
Averaging Time, noncarc (h)	AT_{nc}	17,520	e
Reference Concentration (mg/m^3)	RfC	Chemical Specific	
Unit Risk Factor $(mg/m^3)^{-1}$	URF	Chemical Specific	f
Notes:			
a) Exposure time describes how long each event occurs over a day. It was assumed that residents would be exposed to contaminants by inhaling airborne particulates 8 hours per day during possible construction working hours.			
b) Exposure frequency describes how long each event occurs over a year. It was assumed that residents would be exposed to contaminants by inhaling airborne particulates 5 days per week for 50 weeks of the year.			
c) The duration of exposure period describes the length of time over which the residents may come into contact with contaminants. Construction activities at the site are expected to take approximately 2 years, during which time residents could be exposed to contaminants.			

d) The averaging time for evaluating cancer risk is equal to a lifetime of 70 years.
e) The averaging time for evaluating noncancer risk is equal to the exposure duration.
f) Where appropriate, an age-dependent adjustment factor is applied to the cancer toxicity value to account for the effect of a mutagenic mode of action.

The values in **Table 1** are used to calculate the cumulative cancer risk and noncancer hazard index (HI), varying the concentration of dust (i.e., particulate matter) to find the highest value where the cancer risk and HI are acceptable. USEPA (40 Code of Federal Regulations 300.430, USEPA 1994) and Virginia DEQ (VDEQ 2022) allow a cumulative cancer risk of 1E-04 and an HI of 1.

The cumulative cancer risk and (HI) that may result from exposure to the combination of chemicals are estimated following USEPA guidance (USEPA 1989), as follows:

$$Cumulative\ Risk = \sum_i Risk_i$$

$$Hazard\ Index = \sum_i HQ_i$$

Where:

$Risk_i$ = Estimated cancer risk for the i^{th} constituent
HQ_i = Hazard quotient for the i^{th} constituent

For dust inhalation, the cancer risk is calculated using the chemical concentration in air (C_{air}) and the inhalation URF, as follows:

$$Risk = C_{air} \cdot URF \cdot \frac{ET \cdot EF \cdot ED}{AT_c}$$

The HQ is calculated using C_{air} and the RfC, as follows:

$$HQ = \frac{C_{air}}{RfC} \cdot \frac{ET \cdot EF \cdot ED}{AT_{nc}}$$

The chemical concentration in air (C_{air}) is a function of the concentration of dust (i.e., particulate matter, C_{PM10}) and the chemical concentration in the source of the dust (i.e., site soil, C_{soil}):

$$C_{air} = C_{PM10} * C_{soil}$$

Using the average chemical concentration in site soils (estimated using the 95% UCL), a dust concentration of 150 µg/m^3 (based on the National Ambient Air Quality Standard [NAAQS] for PM_{10}). This results in a cancer risk of 2E-07 and an HI of 0.6, which are below the USEPA and VDEQ cumulative cancer risk limit of 1E-4 and HI limit of 1.

References

USEPA. 1994. 40 Code of Federal Regulations 300.430. National Oil and Hazardous Substances Pollution Contingency Plan. September.

Virginia Department of Environmental Quality (VDEQ). 2022. Virginia Unified Risk Assessment Model (VURAM) User Guide for Risk Assessors. August.

Table 2. Risk Calculations for Exposure of Residents Near Construction to Dust from Site Soil
HRP: 1400 N. Royal Street, Alexandria, VA

						Cancer Risk			Noncancer HI	
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**C_{soil}** (mg/kg)	**C_{air}** (mg/m^3)	**URF** $(mg/m^3)^{-1}$	**f_{inh}**	**Risk**	**RfC** (mg/m^3)	**HQ**
VOC	Acetone	67-64-1	ID	1.46E+00	2.18E-07					
VOC	Benzene	71-43-2	A	4.52E-01	6.78E-08	7.8E-03		3.4E-12	3.0E-02	5.2E-07
VOC	2-Butanone	78-93-3	ID	4.86E-01	7.29E-08				5.0E+00	3.3E-09
VOC	n-Butylbenzene	104-51-8	ID	1.40E-01	2.10E-08					
VOC	sec-Butylbenzene	135-98-8		6.38E-02	9.57E-09					
VOC	Chlorobenzene	108-90-7	D						5.0E-02	
VOC	Chloroform	67-66-3	B2			2.3E-02			5.0E-02	
VOC	Cumene	98-82-8	D	1.39E-01	2.09E-08				4.0E-01	1.2E-08
VOC	p-Cymene	99-87-6	ID	9.93E-02	1.49E-08					
VOC	1,2-Dibromoethane	106-93-4	LC			6.0E-01			9.0E-03	
VOC	1,1-Dichloroethane	75-34-3	SC						5.0E-01	
VOC	1,2-Dichloroethane	107-06-2	B2			2.6E-02			7.0E-03	
VOC	1,1-Dichloroethene	75-35-4	C						2.0E-01	
VOC	cis-1,2-Dichloroethene	156-59-2	ID							
VOC	Ethyl Benzene	100-41-4	D	4.45E-01	6.68E-08				1.0E+00	1.5E-08
VOC	Methyl Acetate	79-20-9	ID	3.41E-01	5.12E-08					
VOC	Methyl tert-butyl ether	1634-04-4	C			2.6E-04			3.0E+00	
VOC	Methylcyclohexane	108-87-2	ID	5.70E+00	8.55E-07					
VOC	Methylene Chloride	75-09-2	LC	6.90E-04	1.04E-10	1.0E-05	1	6.8E-17	6.0E-01	3.9E-11
VOC	Diisopropyl ether	108-20-3							7.0E-01	
VOC	n-Propylbenzene	103-65-1	ID	2.31E-01	3.47E-08					
VOC	tert-Butyl alcohol	75-65-0	SC						5.0E+00	
VOC	Tetrachloroethene	127-18-4	LC			2.6E-04			4.0E-02	
VOC	Toluene	108-88-3	ID	1.89E+00	2.83E-07				5.0E+00	1.3E-08
VOC	Trichloroethene	79-01-6	HC			4.1E-03	0.244		2.0E-03	
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.47E+00	2.20E-07				6.0E-02	8.4E-07
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	4.37E-01	6.56E-08				6.0E-02	2.5E-07
VOC	Xylenes (total)	1330-20-7	ID	5.79E+00	8.68E-07				1.0E-01	2.0E-06
SVOC	Acenaphthene	83-32-9	ID	1.67E-01	2.51E-08					
SVOC	Acenaphthylene	208-96-8	D	1.18E-01	1.77E-08					
SVOC	Acetophenone	98-86-2	D	1.36E-01	2.04E-08					
SVOC	Anthracene	120-12-7	ID	3.05E-01	4.58E-08					
SVOC	Benzo(a)anthracene	56-55-3	B2	4.46E-01	6.69E-08	6.0E-02	1	2.6E-10		
SVOC	Benzo(a)pyrene	50-32-8	HC	3.10E-01	4.65E-08	6.0E-01	1	1.8E-09	2.0E-06	5.3E-03

Table 2. Risk Calculations for Exposure of Residents Near Construction to Dust from Site Soil
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						Cancer Risk			Noncancer HI	
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	C_{soil} (mg/kg)	C_{air} (mg/m^3)	**URF** (mg/m^3)$^{-1}$	f_{inh}	**Risk**	**RfC** (mg/m^3)	**HQ**
SVOC	Benzo(b)fluoranthene	205-99-2	B2	8.65E-01	1.30E-07	6.0E-02	1	5.1E-10		
SVOC	Benzo(e)pyrene	192-97-2								
SVOC	Benzo(g,h,i)perylene	191-24-2	D	2.27E-01	3.41E-08					
SVOC	Benzo(k)fluoranthene	207-08-9	B2	2.64E-01	3.96E-08	6.0E-03	1	1.5E-11		
SVOC	Benzoic Acid	65-85-0	D	1.20E+00	1.80E-07					
SVOC	1,1-Biphenyl	92-52-4	SC							
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	2.12E-01	3.18E-08				3.2E-03	2.3E-06
SVOC	Butylbenzylphthalate	85-68-7	C							
SVOC	Carbazole	86-74-8	B2	1.25E-01	1.88E-08					
SVOC	Chrysene	218-01-9	B2	8.82E-01	1.32E-07	6.0E-04	1	5.2E-12		
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	6.49E-02	9.74E-09	6.0E-01	1	3.8E-10		
SVOC	Dibenzofuran	132-64-9	D	1.14E+00	1.71E-07					
SVOC	Diethylphthalate	84-66-2	D							
SVOC	2,4-Dimethylphenol	105-67-9	ID	2.00E-01	3.00E-08					
SVOC	Di-n-butylphthalate	84-74-2	D							
SVOC	Fluoranthene	206-44-0	ID	8.31E-01	1.25E-07					
SVOC	Fluorene	86-73-7	D	1.82E-01	2.73E-08					
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	2.64E-01	3.96E-08	6.0E-02	1	1.5E-10		
SVOC	Isophorone	78-59-1	C						2.0E+00	
SVOC	1-Methylnaphthalene	90-12-0	SC	2.18E+00	3.27E-07					
SVOC	2-Methylnaphthalene	91-57-6	ID	3.38E+00	5.08E-07					
SVOC	2-Methylphenol	95-48-7	C	1.30E-01	1.95E-08					
SVOC	3&4-Methylphenol	65794-96-9		1.19E-01	1.79E-08					
SVOC	4-Methylphenol	106-44-5	C							
SVOC	Naphthalene	91-20-3	C	1.96E+00	2.94E-07	3.4E-02		6.5E-11	3.0E-03	2.2E-05
SVOC	N-Nitrosodiphenylamine	86-30-6	B2							
SVOC	Pentachlorophenol	87-86-5	LC							
SVOC	Perylene	198-55-0								
SVOC	Phenanthrene	85-01-8	D	1.67E+00	2.51E-07					
SVOC	Pyrene	129-00-0	NC	9.43E-01	1.41E-07					
PEST	Aldrin	309-00-2	B2			4.9E+00				
PEST	alpha-BHC	319-84-6	B2			1.8E+00				
PEST	beta-BHC	319-85-7	C			5.3E-01				
PEST	delta-BHC	319-86-8	D							

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PEST	gamma-BHC	58-89-9	B2-C			3.1E-01				
PEST	4,4'-DDD	72-54-8	B2							
PEST	4,4'-DDE	72-55-9	B2							
PEST	4,4'-DDT	50-29-3	B2			9.7E-02				
PEST	Dieldrin	60-57-1	B2			4.6E+00				
PEST	Endosulfan	115-29-7								
PEST	Endrin	72-20-8	D							
PEST	Heptachlor	76-44-8	B2			1.3E+00				
PEST	Heptachlor epoxide	1024-57-3	B2			2.6E+00				
INORG	Aluminum	7429-90-5	ID	9.23E+03	1.38E-03				5.0E-03	6.3E-02
INORG	Antimony	7440-36-0	ID	1.34E+00	2.01E-07					
INORG	Arsenic	7440-38-2	A	8.80E+00	1.32E-06	4.3E+00		3.7E-08	1.5E-05	2.0E-02
INORG	Barium	7440-39-3	NC	7.27E+01	1.09E-05					
INORG	Beryllium	7440-41-7	B1	9.00E-01	1.35E-07	2.4E+00		2.1E-09	2.0E-05	1.5E-03
INORG	Cadmium	7440-43-9	B1	3.33E-01	5.00E-08	1.8E+00		5.9E-10	1.0E-05	1.1E-03
INORG	Chromium (total)	7440-47-3				1.2E+01			1.0E-04	
INORG	Cobalt	7440-48-4	LC	1.04E+01	1.56E-06	9.0E+00		9.1E-08	6.0E-06	5.9E-02
INORG	Copper	7440-50-8	D	1.55E+02	2.33E-05					
INORG	Cyanide (total)	57-12-5		8.26E-01	1.24E-07				8.0E-04	3.5E-05
INORG	Iron	7439-89-6	D	6.57E+04	9.85E-03					
INORG	Lead	7439-92-1	B2	2.05E+01	3.08E-06					
INORG	Manganese	7439-96-5	D	5.16E+02	7.74E-05				5.0E-05	3.5E-01
INORG	Mercury	7439-97-6	D	5.07E-02	7.61E-09				3.0E-04	5.8E-06
INORG	Molybdenum	7439-98-7								
INORG	Nickel	7440-02-0	A	1.11E+02	1.66E-05	2.4E-01		2.6E-08	9.0E-05	4.2E-02
INORG	Selenium	7782-49-2	D						2.0E-02	
INORG	Silver	7440-22-4	D							
INORG	Thallium	7440-28-0	ID	1.23E+00	1.84E-07					
INORG	Vanadium	7440-62-2	ID	4.04E+01	6.05E-06				1.0E-04	1.4E-02
INORG	Zinc	7440-66-6	ID	4.97E+01	7.45E-06					
CDDF	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TEQ)	1746-01-6-TEQ	B2			3.8E+04			4.0E-08	
		Cumulative Risk:						**2E-07**		**6E-01**

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Chem Group	**Chemical**	**CASRN**	**Cancer Class**	C_{soil} (mg/kg)	C_{air} (mg/m^3)	**URF** (mg/m^3)$^{-1}$	f_{inh}	**Risk**		**RfC** (mg/m^3)	**HQ**
Notes:											
Contaminant concentrations in soil are 95% upper confidence limits on the mean using all site soil.											
Contaminant concentrations in air are caluclated using concentrations in soil and a particulate concentration of 150 ug/m^3.											
Detailed information on contaminant concentrations and risk estimates is found in the Dust Monitoring Plan Technical Appendix.											
f_{inh} is the fraction of the inhalation toxicity value that USEPA identified as having a mutagenic mode of action.											