APPENDIX H

ECOLOGICAL REPORT FOR AOC 1 AND ENTIRE SADVA

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APPENDIX H1 – QUALITATIVE ECOLOGICAL RISK ASSESSMENT FOR SADVA

APPENDIX H
QUALITATIVE ECOLOGICAL RISK ASSESSMENT FOR THE FORMER SADVA

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ACRONYMS AND ABBREVIATIONS

AMSL	Above mean sea level
AOC	Area of concern
COPC	Chemical of potential concern
COPEC	Chemicals of Potential Ecological Concern
CSM	Conceptual site model
DERP-FUDS	Defense Environmental Restoration Program for Formerly Used Defense Sites
DLA	Defense Logistics Agency
DNSC	Defense National Stockpile Center
DOA	U.S. Department of the Army
DoD	Department of Defense
EIS	Environmental Impact Statement
EPC	Exposure point concentration
FS	Feasibility Study
GSA	U.S. General Services Administration
GURA	Guilderland Urban Renewal Agency
HHRA	Human health risk assessment
MCL	Maximum contaminant level
MSSL	Medium-specific screening level
NEIP	Northeast Industrial Park
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCL	Protective concentration level
PVC	Polyvinylchloride
RAB	Restoration Advisory Board
RAGS	Assessment Guidance for Superfund
RI	Remedial Investigation
SADVA	Schenectady Army Depot, Voorheesville Area
SLERA	Screening-level ecological risk assessment
SQL	Sample quantitation limit
SVOC	Semivolatile organic compound
TCEQ	Texas Commission on Environmental Quality
TRRP	Texas Risk Reduction Program
TRV	Toxicity reference values
UCL	Upper confidence limit (95% UCL)
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound

APPENDIX H

QUALITATIVE ECOLOGICAL RISK ASSESSMENT FOR THE FORMER SADVA

H.1 INTRODUCTION

This qualitative ecological risk assessment has been prepared by Parsons for the U.S. Army Corps of Engineers (USACE) as part of the Remedial Investigation (RI) for the former Schenectady Army Depot, Voorheesville Area (SADVA). The former SADVA is located 0.25 mile southeast of the Village of Guilderland Center, New York. The Department of Defense (DoD) held ownership of the SADVA property from 1941 through 1969. The site was originally constructed as a regulating station and a holding and reconsignment point, and later became a general Army depot. The principal mission of the installation was the receipt, storage, maintenance, and distribution of supply items for the U.S. Department of the Army (DOA). The site is presently the Northeastern Industrial Park (NEIP). Much of the information about the site habitats and ecological setting has been taken from the Generic Environmental Impact Statement (EIS) prepared for the NEIP (Galesi Group, 2005). Parsons staff made a site visit in July 2006 to verify, by visual observations, selected information found in the EIS.

H.1.1 Purpose

This document is a qualitative ecological risk assessment for the SADVA. The screening-level ecological risk assessment (SLERA) was conducted to evaluate potential adverse impacts to the ecological receptors due to presence of hazardous contaminants in soil, sediment, and surface water. Throughout the SADVA site, groundwater is typically greater than four feet below ground surface. Plant roots and burrowing animals are unlikely to encounter groundwater. Further, there are no USEPA ecological screening values for groundwater. Therefore, groundwater was not analyzed in this qualitative risk assessment. The SLERA broadly contributes to the site characterization and can be used to develop and evaluate the ecological risks at the site, if any. The objective of the SLERA is to evaluate whether unacceptable adverse risks may be present, or if risks may be posed to ecological receptors in the future. This objective was met by characterizing ecological plant and animal communities at or near the site, defining and describing the contaminant that may affect the environmental media at the site, and identifying the potential pathways for exposure to contaminants at the site.

H.1.2 Ecological Risk Assessment

H.1.2.1 A qualitative SLERA was conducted for the SADVA site in accordance with the following guideline:

- USEPA *Guidelines for Ecological Risk Assessment* Final. EPA 630-R-95-002F (April 1998).

H.1.2.2 The current (USEPA, 1998) ecological risk assessment paradigm includes three phases (problem formulation, analysis of ecological risk, and risk characterization), and these phases are divided into eight general steps, as summarized below.

Problem Formulation

1. *Chemical Screening Analysis*. Elimination of Chemicals of Potential Ecological Concern (COPECs) on the basis of background concentrations in exposure media, as well as ecological benchmarks for non-bioaccumulative COPECs.
2. *Exposure Pathway Analysis*. Identification of communities (e.g., soil invertebrates, benthic invertebrates) and major feeding guilds (e.g., omnivorous mammals, piscivorous birds) and their representative species which are supported by habitats for each complete or reasonably anticipated complete exposure pathway.
3. *Conceptual Exposure Model*. Development of conceptual site models which graphically depict the movement of COPECs through media to communities and the feeding guilds.
4. *COPEC Fate and Transport*. Evaluation of the fate and potential rate of transport of screened COPECs, and compilation of their toxicological profiles.

Analysis of Ecological Risk

5. *Exposure Assessment*. Development of exposure equations and calculation of intake rates for direct, indirect and combined exposures for representative receptors.
6. *Receptor Effect Levels*. Gathering of toxicity information (i.e. NOAEL, LOAEL) for representative receptors and COPECs retained for the analysis, and identification of any applicable media-based toxicity reference values (TRVs).

Risk Characterization

7. *Hazard Quotient Analyses*. Use of the ecological hazard quotient methodology to compare exposures to TRVs to eliminate COPECs that pose no unacceptable risk, and use of less conservative assumptions to adjust the exposure and repeat the hazard quotient calculation to eliminate additional COPECs not likely to pose unacceptable risks.
8. *Uncertainty Analysis*. Analysis of the major areas of uncertainty associated with the ecological risk assessment, including a justification for not developing PCLs for particular COPECs/pathways, if appropriate.

H.1.2.3 This qualitative SLERA addresses the first phase of ecological risk assessment, the problem formulation (*i.e.*, steps 1 through 4).

H.1.3 Organization

This report is comprised of the following sections:

Section 1 Introduction

Section 2 Chemical Screening Analysis

Section 3 Exposure Pathway Analysis
Section 4 Ecological Conceptual site model
Section 5 COPEC Fate and Transport
Section 6 Conclusions and Recommendations
Section 7 References

H.2 COPEC SCREENING ANALYSIS

H.2.1 The media included in the SLERA are soil, sediment, surface water, and groundwater. This SLERA is intended to describe potential ecological risks to receptors throughout the site. However, data collected within each area of concern (AOC) are not necessarily the same. For example, AOC 8 is Black Creek, and therefore, only surface water and sediment were sampled within this AOC, and soil was not sampled. In other areas without surface water, only soil was sampled, not sediment and surface water. Sediments collected downstream of AOC 5 were included; however, AOC 5 soils were not included in this assessment because AOC 5 soils are being separately addressed in a site-specific RI report prepared by the site operator, the Defense National Stockpile Center. All samples within a class (*e.g.*, volatile organic compound (VOCs)) were analyzed, but only samples for which there was at least one detected compound were retained for analyses. Therefore, the COPEC screening analysis was conducted for each media, and the screening analysis includes available data as follows:

- Soils: Data from AOCs 1 and 7 (combined), AOC 2, AOC 3, AOC 6, and AOC 9 were combined for screening. The maximum value of the combined data was used.
- Sediments: Data from AOCs 1 and 7 (combined), AOC 2, AOC 5, and AOC 8 were combined for screening. The maximum value of the combined data was used.
- Surface Water: Data from AOCs 1 and 7 (combined) and AOC 8 were combined for screening. The maximum value of the combined data was used.
- Groundwater: Throughout the SADVA site, groundwater is typically greater than four feet below ground surface. Plant roots and burrowing animals are unlikely to encounter groundwater. Further, there are no USEPA ecological screening values for groundwater. Therefore, groundwater was not analyzed in this qualitative risk assessment.

H.2.2 Chemicals and metals (hereafter, referred to as “chemicals’) with concentrations above detection limits were initially included in the analysis. The analysis was conducted on the basis of maximum detected concentrations over the entire site.

H.2.3 An initial screening of chemicals was conducted on the basis of background concentrations in any given media. If no background concentration was available, the chemical was retained in the analysis. Non-bioaccumulative chemicals were screened by comparison to selected ecological benchmarks. For New York, there were environmental screening concentrations available for sediment, but not for soils, surface water, or groundwater. For soils, surface water and groundwater, USEPA Region 5 ecological screening levels were used. To determine if a chemical was retained for analysis, the following rules were used:

- If the chemical concentration was less than the background concentration, it was screened out of the analyses (eliminated).
- If the chemical concentration of sediment was greater than background concentration, but less than the NYS sediment screening criteria, it was eliminated.
- If the chemical concentration is greater than background, and greater than the USEPA region 5 screening level, then it was retained for analysis.
- Bioaccumulative compounds were retained in the analysis, regardless of whether they exceed screening levels (either background or USEPA screening levels).

H.2.4 Within each media, the following classes of chemicals were included in the laboratory analyses:

- VOCs
- SVOCs
- Pesticides and PCBs
- Metals

H.2.5 Each medium and the component constituents are addressed below.

Soils

H.2.6 The SLERA was conducted for surface soil samples to a depth of two feet below ground surface (bgs) with validated data collected from AOC 1/7 (combined), AOC 2, AOC 3, AOC 6, and AOC 9. Data are shown in Table H.1.

- VOCs: Twenty VOCs were detected, and three VOCs were retained for further analysis.
- SVOCs: Twenty-seven SVOCs were detected. Twenty-two SVOCs were retained for further analysis.
- Pesticides and PCBs: Seven pesticides and one PCB were detected. Five pesticides and one PCB were retained for further analysis.
- Metals: Nineteen metals were detected. Eighteen metals were retained for further analysis.

Sediment

H.2.7 The SLERA was conducted for sediments collected from AOCs 1 and 7 (combined), 2, 5 and AOC 8. Data are shown in Table H.2.

- VOCs: One VOC was detected, but none were retained for further analysis.
- SVOCs: Twenty SVOCs were detected. Eighteen SVOCs were retained for further analysis.
- Pesticides and PCBs: Seventeen pesticides and one PCB were detected. Twelve pesticides and one PCB were retained for further analysis.
- Metals: Eighteen metals were detected, and all were retained for further analysis.

Table H.1 Soil Screening Summary
Qualitative Ecolgical Risk Assessment for SADVA

CAS No.	Compound [1]	AOC 1/7 Max Exposure Point Concentration (units)	AOC 2 Max Exposure Point Concentration (units)	AOC 3 Exposure Point Concentration (units)	AOC 6 Exposure Point Concentration (units)	AOC 9 Exposure Point Concentration (units)	Site-wide Max Exposure Point Concentration (units)	Site Background Range (units)	USEPA Region 5 Ecological Screening Levels (units)	Max EPC> background	Max EPC> USEPA	Bio-Accumulative?	Retain for SLERA
	VOLATILES												
67-64-1	Acetone	2600 µg/kg	150 µg/kg	41 µg/kg	4 µg/kg	51 µg/kg	2,600 µg/kg	ND - 3.1 µg/kg	2500 µg/kg	yes	yes	no	yes
71-43-2	Benzene		230 µg/kg				230 µg/kg		255 µg/kg	yes	no	no	no
78-93-3	2-Butanone	170 µg/kg					170 µg/kg		89600 µg/kg	yes	no	no	no
75-15-0	Carbon Disulfide		15 µg/kg				15 µg/kg		94.1 µg/kg	yes	no	no	no
108-90-7	Chlorobenzene			96 µg/kg			96 µg/kg		13100 µg/kg	yes	no	no	no
67-66-3	Chloroform		5 µg/kg			5.9 µg/kg	6 µg/kg		1190 µg/kg	yes	no	no	no
74-87-3	Chloromethane		6 µg/kg				6 µg/kg		10400 µg/kg	yes	no	no	no
540-59-0	1,2-dichloroethene (total)			5 µg/kg			5 µg/kg		µg/kg	yes	yes	no	yes
156-60-5	trans-1,2 Dichloroethene		120 µg/kg	1.2 µg/kg			120 µg/kg		784 µg/kg	yes	no	no	no
100-41-4	Ethylbenzene	24 µg/kg	1,100 µg/kg	66 µg/kg			1,100 µg/kg		5160 µg/kg	yes	no	no	no
76-13-1	Freon 113		11 µg/kg				11 µg/kg		µg/kg	yes	yes	no	yes
75-09-2	Methylene Chloride		33 µg/kg	43 µg/kg			43 µg/kg		4050 µg/kg	yes	no	no	no
108-10-1	4-Methyl-2-Pentanone (MIBK)		16 µg/kg				16 µg/kg		443000 µg/kg	yes	no	no	no
100-42-5	Styrene		30 µg/kg				30 µg/kg		4960 µg/kg	yes	no	no	no
79-01-6	Trichloroethene	8 µg/kg		43 µg/kg			43 µg/kg		12400 µg/kg	yes	no	no	no
79-00-5	1,1,2-Trichloroethane		55 µg/kg				55 µg/kg		28600 µg/kg	yes	no	no	no
127-18-4	Tetrachloroethene			8 µg/kg			8 µg/kg		9920 µg/kg	yes	no	no	no
108-88-3	Toluene	4 µg/kg	240 µg/kg	6 µg/kg		8.2 µg/kg	240 µg/kg		5450 µg/kg	yes	no	no	no
75-01-4	Vinyl Chloride	8 µg/kg	16 µg/kg				16 µg/kg		646 µg/kg	yes	no	no	no
1330-20-7	Xylenes (total)	530 µg/kg	1,030 µg/kg	110 µg/kg			1,030 µg/kg		10000 µg/kg	yes	no	no	no
	SEMIVOLATILES												
83-32-9	Acenaphthene	350 µg/kg		83 µg/kg		48 µg/kg	350 µg/kg		682000 µg/kg	yes	no	yes	yes
200-96-8	Acenaphthylene	120 µg/kg					120 µg/kg		682000 µg/kg	yes	no	no	no
120-12-7	Anthracene	730 µg/kg	51 µg/kg	66 µg/kg		38 µg/kg	730 µg/kg	ND - 61 µg/kg	1480000 µg/kg	yes	no	yes	yes
65-85-0	Benzoic acid			389 µg/kg			389 µg/kg		µg/kg	yes	yes	no	yes
56-55-3	Benzo(a)anthracene	2400 µg/kg			34 µg/kg	110 µg/kg	2,400 µg/kg	ND - 410 µg/kg	5210 µg/kg	yes	no	yes	yes
50-32-8	Benzo(a)pyrene	2400 µg/kg	54 µg/kg				2,400 µg/kg	ND - 550 µg/kg	1520 µg/kg	yes	yes	yes	yes
205-99-2	Benzo(b)fluoranthene	2700 µg/kg	350 µg/kg		73 µg/kg	140 µg/kg	2,700 µg/kg	ND - 620 µg/kg	59800 µg/kg	yes	no	yes	yes
207-08-9	Benzo(k)fluoranthene	940 µg/kg	56 µg/kg		65 µg/kg	130 µg/kg	940 µg/kg	ND - 550 µg/kg	148000 µg/kg	yes	no	yes	yes
191-24-2	Benzo(g,h,i)perylene	1600 µg/kg			56 µg/kg		1,600 µg/kg		119000 µg/kg	yes	no	yes	yes
117-81-7	bis(2-ethylhexyl) phthalate		220,000 µg/kg	162 µg/kg		410 µg/kg	220,000 µg/kg		925 µg/kg	yes	yes	no	yes
86-74-8	Carbazole	1300 µg/kg					1,300 µg/kg	ND - 54 µg/kg	µg/kg	yes	yes	no	yes
218-01-9	Chrysene	2800 µg/kg	56 µg/kg	46 µg/kg	230 µg/kg	240 µg/kg	2,800 µg/kg	ND - 680 µg/kg	4730 µg/kg	yes	no	yes	yes
53-70-3	Dibenz(a,h)anthracene	420 µg/kg			13 µg/kg		420 µg/kg	ND - 55 µg/kg	18400 µg/kg	yes	no	yes	yes
132-64-9	Dibenzofuran	120 µg/kg		37 µg/kg		30 µg/kg	120 µg/kg		µg/kg	yes	yes	no	yes
105-67-9	2,4-Dimethylphenol	150 µg/kg					150 µg/kg		10 µg/kg	yes	yes	no	yes
84-74-2	Di-n-butyl phthalate	100 µg/kg	260 µg/kg				260 µg/kg		150 µg/kg	yes	yes	no	yes
117-84-0	di-n-Octyl Phthalate		62 µg/kg				62 µg/kg		709000 µg/kg	yes	no	no	no
206-44-0	Fluoranthene	6100 µg/kg	62 µg/kg		52 µg/kg	230 µg/kg	6,100 µg/kg	ND - 940 µg/kg	122000 µg/kg	yes	no	yes	yes
86-73-7	Fluorene	220 µg/kg	37 µg/kg	140 µg/kg		51 µg/kg	220 µg/kg	ND - 23 µg/kg	122000 µg/kg	yes	no	yes	yes
193-39-5	Indeno(1,2,3-cd)pyrene	1700 µg/kg			52 µg/kg		1,700 µg/kg	ND - 230 µg/kg	109000 µg/kg	yes	no	yes	yes
78-59-1	Isophorone		76 µg/kg				76 µg/kg		139000 µg/kg	yes	no	no	no
91-57-6	2-Methylnaphthalene	230 µg/kg	310 µg/kg	250 µg/kg		27 µg/kg	310 µg/kg		3240 µg/kg	yes	no	no	no
91-20-3	Naphthalene	410 µg/kg	1,200 µg/kg	140 µg/kg	23 µg/kg		1,200 µg/kg		99.4 µg/kg	yes	yes	no	yes
86-30-6	N-Nitrosodiphenylamine	68 µg/kg					68 µg/kg		545 µg/kg	yes	no	no	no
87-86-5	Pentachlorophenol			569 µg/kg			569 µg/kg		119 µg/kg	yes	yes	no	yes
85-01-8	Phenanthrene	3100 µg/kg	240 µg/kg	420 µg/kg	59 µg/kg	200 µg/kg	3,100 µg/kg	ND - 480 µg/kg	45700 µg/kg	yes	no	yes	yes
129-00-0	Pyrene	4200 µg/kg	85 µg/kg	67 µg/kg	55 µg/kg	210 µg/kg	4,200 µg/kg	ND - 750 µg/kg	78500 µg/kg	yes	no	yes	yes
	PESTICIDES												
72-54-8	4,4'-DDD	2.7 µg/kg	240 µg/kg	2.59 µg/kg	1.2 µg/kg		240 µg/kg	ND - 1.2 µg/kg	758 µg/kg	yes	no	yes	yes
72-55-9	4,4'-DDE	2.1 µg/kg	52 µg/kg	23.8 µg/kg	2.7 µg/kg		52 µg/kg	ND - 9.4 µg/kg	596 µg/kg	yes	no	yes	yes
50-29-3	4,4'-DDT	6.9 µg/kg	390 µg/kg	95.1 µg/kg	2.2 µg/kg		390 µg/kg	0.61 - 15 µg/kg	3.5 µg/kg	yes	yes	yes	yes
72-20-8	Endrin	0.29 µg/kg					0.29 µg/kg		10.1 µg/kg	yes	no	yes	yes
7421-93-4	Endrin aldehyde	2.9 µg/kg					3 µg/kg		10.5 µg/kg	yes	no	no	no

Table H.1 Soil Screening Summary
Qualitative Ecolgical Risk Assessment for SADVA

CAS No.	Compound [1]	AOC 1/7 Max Exposure Point Concentration (units)	AOC 2 Max Exposure Point Concentration (units)	AOC 3 Exposure Point Concentration (units)	AOC 6 Exposure Point Concentration (units)	AOC 9 Exposure Point Concentration (units)	Site-wide Max Exposure Point Concentration (units)	Site Background Range (units)	USEPA Region 5 Ecological Screening Levels (units)	Max EPC> background	Max EPC> USEPA	Bio-Accumulative?	Retain for SLERA
58-89-9	Gamma-BHC (Lindane)		1 µg/kg				1 µg/kg		5 µg/kg	yes	no	no	no
5103-71-9	alpha-Chlordane				0.43 µg/kg		0.43 µg/kg		µg/kg	yes	yes	yes	yes
	PCBs												
11096-82-5	Aroclor 1260	160 µg/kg					160 µg/kg		µg/kg	yes	yes	no	yes
	METALS												
7429-90-5	Aluminum	12100 mg/kg	27,300 mg/kg	29,700.00 mg/kg	14200 mg/kg	17900 mg/kg	29,700 mg/kg	7,080 - 12,800 mg/kg	-- mg/kg	yes	no	yes	yes
7440-36-0	Antimony	0.36 mg/kg	4 mg/kg	3.39 mg/kg	0.96 mg/kg	0.62 mg/kg	4 mg/kg	0.2 - 0.59 mg/kg	0.142 mg/kg	yes	yes	yes	yes
7440-38-2	Arsenic	6.7 mg/kg	13 mg/kg	11.50 mg/kg	8.7 mg/kg	9.5 mg/kg	13 mg/kg	4.3 - 16.4 mg/kg	5.7 mg/kg	no	--	no	no
7440-39-3	Barium	47.4 mg/kg	246 mg/kg	123.00 mg/kg	63.4 mg/kg	121 mg/kg	246 mg/kg	33 - 104 mg/kg	1.04 mg/kg	yes	yes	no	yes
7440-41-7	Beryllium	0.59 mg/kg	1 mg/kg	1.53 mg/kg	0.95 mg/kg	1.1 mg/kg	2 mg/kg	0.38 - 0.67 mg/kg	1.06 mg/kg	yes	yes	no	yes
7440-43-9	Cadmium	0.65 mg/kg	1 mg/kg	54.40 mg/kg	0.37 mg/kg	0.84 mg/kg	54 mg/kg	0.21 - 0.52 mg/kg	0.00222 mg/kg	yes	yes	yes	yes
7440-47-3	Chromium (total)	337 mg/kg	35 mg/kg	40.2 mg/kg	19.3 mg/kg	18 mg/kg	337 mg/kg	9.3 - 17.5 mg/kg	0.4 mg/kg	yes	yes	yes	yes
18540-29-9	Chromium VI	350 mg/kg		mg/kg	mg/kg	mg/kg	350 mg/kg		0 mg/kg	yes	yes	yes	yes
7440-48-4	Cobalt	13.3 mg/kg	41 mg/kg	26.50 mg/kg	17.6 mg/kg	15.7 mg/kg	41 mg/kg	5.3 - 12.2 mg/kg	0.14 mg/kg	yes	yes	yes	yes
7440-50-8	Copper	32.7 mg/kg	50 mg/kg	68.60 mg/kg	36.1 mg/kg	33.5 mg/kg	69 mg/kg	13.4 - 26.9 mg/kg	5.4 mg/kg	yes	yes	yes	yes
7439-92-1	Lead	35.4 mg/kg	40 mg/kg	316.9 mg/kg	26.6 mg/kg	98.8 mg/kg	317 mg/kg	16.5 - 60.8 mg/kg	0.0537 mg/kg	yes	yes	yes	yes
7439-96-5	Manganese	649 mg/kg	977 mg/kg	832.00 mg/kg	525 mg/kg	585 mg/kg	977 mg/kg	197 - 875 mg/kg	0 mg/kg	yes	yes	no	yes
7439-97-6	Mercury	0.064 mg/kg	0 mg/kg	0.17 mg/kg	0.19 mg/kg	0.055 mg/kg	0 mg/kg	0.039 - 0.095 mg/kg	0.1 mg/kg	yes	yes	yes	yes
7440-02-0	Nickel	27.3 mg/kg	45 mg/kg	195.00 mg/kg	36 mg/kg	35.3 mg/kg	195 mg/kg	10.6 - 24.8 mg/kg	13.6 mg/kg	yes	yes	yes	yes
7782-49-2	Selenium		2 mg/kg	7.71 mg/kg	1.5 mg/kg	mg/kg	8 mg/kg	0.44 - 1.2 mg/kg	0.0276 mg/kg	yes	yes	yes	yes
7440-22-4	Silver	1.9 mg/kg	2 mg/kg	3.97 mg/kg	0.39 mg/kg	0.16 mg/kg	4 mg/kg	0.16 - 0.17 mg/kg	4.04 mg/kg	yes	no	yes	yes
7440-28-0	Thallium	0.55 mg/kg	2 mg/kg	11.70 mg/kg	0.87 mg/kg	0.9 mg/kg	12 mg/kg	ND - 0.67 mg/kg	0.0569 mg/kg	yes	yes	yes	yes
7440-62-2	Vanadium	25.2 mg/kg	45 mg/kg	44.30 mg/kg	23.4 mg/kg	32.5 mg/kg	45 mg/kg	13.7 - 24 mg/kg	1.59 mg/kg	yes	yes	yes	yes
7440-66-6	Zinc	114 mg/kg	111 mg/kg	192.00 mg/kg	96.9 mg/kg	496 mg/kg	496 mg/kg	46 - 134 mg/kg	6.62 mg/kg	yes	yes	yes	yes

ND Not detected
blank cells indicate no value available

Table H.2 Sediment Screening Summary
Qualitative Ecological Risk Assessment for SADVA

CAS No.	Compound	AOC 1/7 Exposure Point Concentration (units)	AOC 2 Exposure Point Concentration (units)	AOC 5 Exposure Point Concentration (units)	AOC 8 Exposure Point Concentration (units)	Site-Wide Maximum Exposure Point Concentration (units)	Site-specific Background/upstream Ranges (units)	USEPA Region 5 Ecological Screening Levels (units)	EPC> background	EPC> USEPA	bio-accumulative	Retain for SLERA
	VOLATILES											
67-64-1	Acetone	7.5 µg/kg			3.4 µg/kg	7.5 µg/kg	ND - 14 µg/kg	9.9 µg/kg	no	--	no	no
	SEMIVOLATILES											
83-32-9	Acenaphthene	700 µg/kg			160 µg/kg	700 µg/kg	ND - 92 µg/kg	5.87 µg/kg	yes	yes	yes	yes
120-12-7	Anthracene	1500 µg/kg			670 µg/kg	1500 µg/kg	ND - 170 µg/kg	57.2 µg/kg	yes	yes	yes	yes
56-55-3	Benzo(a)anthracene	2400 µg/kg			2200 µg/kg	2400 µg/kg	ND - 310 µg/kg	108 µg/kg	yes	yes	yes	yes
50-32-8	Benzo(a)pyrene	2200 µg/kg			2900 µg/kg	2900 µg/kg	ND - 330 µg/kg	150 µg/kg	yes	yes	yes	yes
205-99-2	Benzo(b)fluoranthene	1900 µg/kg			3700 µg/kg	3700 µg/kg	ND - 440 µg/kg	10400 µg/kg	yes	no	yes	yes
191-24-2	Benzo(ghi)perylene	570 µg/kg			1300 µg/kg	1300 µg/kg	ND - 66 µg/kg	119000 µg/kg	yes	no	yes	yes
207-08-9	Benzo(k)fluoranthene	2300 µg/kg			1300 µg/kg	2300 µg/kg	ND - 360 µg/kg	240 µg/kg	yes	yes	yes	yes
117-81-7	bis(2-Ethylhexyl) phthalate	390 µg/kg	100 µg/kg		240 µg/kg	390 µg/kg	ND	182 µg/kg	yes	yes	no	yes
86-74-8	Carbazole	740 µg/kg			650 µg/kg	740 µg/kg	ND - 50 µg/kg		yes	yes	no	yes
218-01-9	Chrysene	2400 µg/kg			3000 µg/kg	3000 µg/kg	ND - 730 µg/kg	166 µg/kg	yes	yes	yes	yes
53-70-3	Dibenz(a,h)anthracene	280 µg/kg			270 µg/kg	280 µg/kg	ND	33 µg/kg	yes	yes	yes	yes
132-64-9	Dibenzofuran	310 µg/kg			110 µg/kg	310 µg/kg	ND - 50 µg/kg	449 µg/kg	yes	no	no	no
84-74-2	Di-n-butyl Phthalate	350 µg/kg			48 µg/kg	350 µg/kg		1114 µg/kg	yes	no	no	no
206-44-0	Fluoranthene	5400 µg/kg			8100 µg/kg	8100 µg/kg	ND - 1,200 µg/kg	423 µg/kg	yes	yes	yes	yes
86-73-7	Fluorene	650 µg/kg			230 µg/kg	650 µg/kg	ND - 100 µg/kg	77.4 µg/kg	yes	yes	yes	yes
193-39-5	Indeno(1,2,3-cd)pyrene	650 µg/kg			1200 µg/kg	1200 µg/kg	ND - 78 µg/kg	200 µg/kg	yes	yes	yes	yes
91-57-6	2-Methylnaphthalene	230 µg/kg			µg/kg	230 µg/kg	ND	20.2 µg/kg	yes	yes	no	yes
91-20-3	Naphthalene	300 µg/kg			53 µg/kg	300 µg/kg	ND - 210 µg/kg	176 µg/kg	yes	yes	yes	yes
85-01-8	Phenanthrene	5800 µg/kg			680 µg/kg	5800 µg/kg	ND - 400 µg/kg	204 µg/kg	yes	yes	yes	yes
129-00-0	Pyrene	3600 µg/kg			5500 µg/kg	5500 µg/kg	ND - 920 µg/kg	195 µg/kg	yes	yes	yes	yes
	PESTICIDES/PCBs											
72-54-8	4,4'-DDD	2400 µg/kg	2.2 µg/kg		22 µg/kg	2400 µg/kg	ND	4.88 µg/kg	yes	yes	yes	yes
72-55-9	4,4'-DDE	540 µg/kg	4.3 µg/kg		190 µg/kg	540 µg/kg	ND - 0.23 µg/kg	3.16 µg/kg	yes	yes	yes	yes
50-29-3	4,4'-DDT	630 µg/kg	7.3 µg/kg		93 µg/kg	630 µg/kg	ND	4.16 µg/kg	yes	yes	yes	yes
319-84-6	alpha-BHC				0.17 µg/kg	0.17 µg/kg		6 µg/kg	yes	no	no	no
319-85-7	beta-BHC	4.5 µg/kg			0.36 µg/kg	4.5 µg/kg		5 µg/kg	yes	no	no	no
319-86-8	delta-BHC	3.2 µg/kg	0.12 µg/kg		µg/kg	3.2 µg/kg	ND NC	71500 µg/kg	no	--	no	no
58-89-9	gamma-BHC (lindane)	1.5 µg/kg			µg/kg	1.5 µg/kg		2.37 µg/kg	yes	no	no	no
5103-71-9	alpha-Chlordane	1.1 µg/kg	1.1 µg/kg		2.00 µg/kg	2 µg/kg	ND		yes	yes	yes	yes
57-74-9	gamma-Chlordane				0.84 µg/kg	0.84 µg/kg		3.24 µg/kg	yes	no	yes	yes
60-57-1	Dieldrin				0.48 µg/kg	0.48 µg/kg		1.9 µg/kg	yes	no	no	no
959-99-8	Endosulfan I	3.6 µg/kg			µg/kg	3.6 µg/kg		3.26 µg/kg	yes	yes	yes	yes
33213-65-9	Endosulfan II	0.31 µg/kg			1.10 µg/kg	1.1 µg/kg		1.94 µg/kg	yes	no	yes	yes
1031-07-8	Endosulfan sulfate				2.40 µg/kg	2.4 µg/kg	ND	34.6 µg/kg	yes	no	yes	yes
72-20-8	Endrin	0.23 µg/kg	0.73 µg/kg		3.40 µg/kg	3.4 µg/kg	ND	2.22 µg/kg	yes	yes	yes	yes
7421-93-4	Endrin aldehyde				1.40 µg/kg	1.4 µg/kg	ND	480 µg/kg	yes	no	yes	yes
76-44-8	Heptachlor		0.33 µg/kg			0.33 µg/kg		0.6 µg/kg	yes	no	yes	yes
1024-57-3	Heptachlor epoxide				0.50 µg/kg	0.5 µg/kg	ND	2.47 µg/kg	yes	no	yes	yes
11097-69-1	Aroclor 1254	290 µg/kg			110 µg/kg	290 µg/kg	ND		yes	yes	yes	yes
	METALS											
7429-90-5	Aluminum	16400 mg/kg	17400 mg/kg	15000 mg/kg	14900 mg/kg	17400 mg/kg	8040 17,900 mg/kg		no	--	yes	yes
7440-36-0	Antimony	7.9 mg/kg	0.61 mg/kg	0.57 mg/kg	1.1 mg/kg	7.9 mg/kg	ND - 0.44 mg/kg		yes	yes	yes	yes
7440-38-2	Arsenic	9.5 mg/kg	7.3 mg/kg	13 mg/kg	22.5 mg/kg	22.5 mg/kg	3.1 - 5.1 mg/kg	9.79 mg/kg	yes	yes	no	yes
7440-39-3	Barium	258 mg/kg	1760 mg/kg	84 mg/kg	1030 mg/kg	1760 mg/kg	53.9 - 141 mg/kg		yes	yes	no	yes
7440-41-7	Beryllium	7.6 mg/kg	0.7 mg/kg	1.1 mg/kg	1.3 mg/kg	7.6 mg/kg	0.62 - 0.92 mg/kg		yes	yes	no	yes
7440-43-9	Cadmium	1.2 mg/kg	0.59 mg/kg	0.55 mg/kg	0.97 mg/kg	1.2 mg/kg	ND - 0.75 mg/kg	0.99 mg/kg	yes	yes	yes	yes
7440-47-3	Chromium	359 mg/kg	20.5 mg/kg	44.2 mg/kg	149 mg/kg	359 mg/kg	11.2 - 22 mg/kg	43.4 mg/kg	yes	yes	yes	yes
7440-48-4	Cobalt	47.4 mg/kg	13.8 mg/kg	15.8 mg/kg	34.8 mg/kg	47.4 mg/kg	7.1 - 14 mg/kg	50 mg/kg	yes	yes	yes	yes
7440-50-8	Copper	491 mg/kg	27.9 mg/kg	118 mg/kg	205 mg/kg	491 mg/kg	13 - 27.7 mg/kg	31.6 mg/kg	yes	yes	yes	yes
7439-92-1	Lead	2440 mg/kg	69.9 mg/kg	90 mg/kg	182 mg/kg	2440 mg/kg	7.8 - 20.9 mg/kg	35.8 mg/kg	yes	yes	yes	yes
7439-96-5	Manganese	4880 mg/kg	545 mg/kg	641 mg/kg	10100 mg/kg	10100 mg/kg	328 - 647 mg/kg		yes	yes	yes	yes
7439-97-6	Mercury	0.11 mg/kg	0.18 mg/kg	0.08 mg/kg	0.12 mg/kg	0.18 mg/kg	0.027 - 0.091 mg/kg	0.174 mg/kg	yes	yes	yes	yes
7440-02-0	Nickel	124 mg/kg	26.1 mg/kg	39.1 mg/kg	35.5 mg/kg	124 mg/kg	15.6 - 24.5 mg/kg	22.4 mg/kg	yes	yes	yes	yes
7782-49-2	Selenium	1.5 mg/kg	2.1 mg/kg	0.82 mg/kg	1.5 mg/kg	2.1 mg/kg	ND - 0.81 mg/kg		yes	yes	yes	yes
7440-22-4	Silver	0.66 mg/kg	0.77 mg/kg	0.25 mg/kg	0.58 mg/kg	0.77 mg/kg	ND - 0.5 mg/kg	0.5 mg/kg	yes	yes	yes	yes
7440-28-0	Thallium	0.58 mg/kg	1.5 mg/kg	0.73 mg/kg	0.96 mg/kg	1.5 mg/kg	ND - 1.5 mg/kg		no	--	yes	yes
7440-62-2	Vanadium	97 mg/kg	30.1 mg/kg	29.5 mg/kg	34.6 mg/kg	97 mg/kg	14.6 - 28.4 mg/kg		yes	yes	yes	yes
7440-66-6	Zinc	2960 mg/kg	407 mg/kg	176 mg/kg	668 mg/kg	2960 mg/kg	47.7 - 118 mg/kg	121 mg/kg	yes	yes	yes	yes

ND Not detected
blank cells indicate no value available

Surface Water

H.2.8 The SLERA was conducted for surface water samples collected from AOC 1 and 7 (combined) and AOC 8. Data are shown in Table H.3.

- VOCs: Five VOCs were detected, none were retained for analysis.
- SVOCs: Four SVOCs were detected and all were retained for analysis.
- Pesticides and PCBs: No pesticides or PCBs were detected.
- Metals: Seventeen metals were detected, and fourteen were retained for analysis.

H.3 EXPOSURE PATHWAY ANALYSIS

H.3.1 The former SADVA is located 0.25 miles southeast of the Village of Guilderland Center, New York. This site is divided into eight Areas of Concern (AOCs) that include areas where contamination is likely to be present. Data collected at seven of the AOCs are included in the SLERA; AOC 1/7 (combined), AOC 2, AOC 3, AOC 5, AOC 6, AOC 8, and AOC 9. For the SLERA, the maximum value of the combined AOCs for each media is utilized in the analysis. Sediments collected downstream of AOC 5 were included; however, AOC 5 soils were not included in this assessment because AOC 5 soils are being separately addressed in a site-specific RI report prepared by the site operator, the Defense National Stockpile Center. AOC 4 was not included because this area has not been shown to be related to former Department of Defense operations.

H.3.2 The NEIP is generally flat, with gradual slopes that range from 0 to 8%. The area of the developed portion of the site is approximately 330 feet above mean sea level (AMSL) (Galesi Group 2005).

Soils

H.3.3 Soils within the NEIP are generally gravelly loams and silt loams. The depth to bedrock varies from 20 inches to more than six feet. Many of the soils in the developable portions of the NEIP pose severe limitations to construction activities due to wetness or other factors. Severe limitations to development include soil properties that are unfavorable or difficult to overcome, which may require special design or engineering plan, or which may require extensive maintenance. For additional information about specific soils present in the NEIP and the limitations to development, see the *Soil Survey of Albany County*, *New York* (USDA Soil Conservation Service, 1992), summarized in Galesi Group (2005).

Groundwater

H.3.4 Previous groundwater sampling within SADVA indicated that contamination may be present, but is limited in extent (Parsons, 2001; Malcolm Pirnie, 1997, Parsons, 2005). Groundwater typically occurs at depths greater than four feet. Since there are no complete exposure pathways for ecological receptors, groundwater is not evaluated in this report.

Table H.3 Surface Water Screening Summary
Qualitative Ecological Risk Assessment for SADVA

CAS No.	Compound[1]	AOC 1/7 Exposure Point Concentration (units)	AOC 8 Exposure Point Concentration (units)	Site-Wide Maximum Eposure Point Concentration (units)	Site-specific Upstream Concentration Range (units)	NYSDEC Background Class A Water (units)	NYSDEC Background Class C water (units)	USEPA Region 5 Ecologicial Screening Level (units)	EPC>background?	EPC> NYSDEC Class A	EPC> NYSDEC Class C	EPC> USEPA	Bio-accumulative?	Retain for SLERA?
	VOLATILES													
67-64-1	Acetone	10 µg/L	2.2 µg/L	10 µg/L	ND - 2 µg/L			1,700 µg/L	yes	yes	yes	no	no	no
75-15-0	Carbon disulfide	0.99 µg/L	µg/L	1 µg/L				15 µg/L	yes	yes	yes	no	no	no
75-34-3	1,1-Dichloroethane	27 µg/L	µg/L	27 µg/L				47 µg/L	yes	yes	yes	no	no	no
108-88-3	Toluene	0.24 µg/L	µg/L	0 µg/L		5 µg/L	6,000 µg/L	253 µg/L	yes	no	no	no	no	no
79-01-6	Trichloroethene	10 µg/L	µg/L	10 µg/L		5 µg/L		47.000 µg/L	yes	yes	yes	no	no	no
	SEMIVOLATILES													
117-81-7	bis(2-Ethylhexyl) phthalate	73 µg/L	11 µg/L	73.00 µg/L	ND - 26 µg/L	5 µg/L		0.30 µg/L	yes	yes	yes	yes	yes	yes
84-66-2	Diethyl phthalate		0.33 µg/L	0.33 µg/L				110 µg/L	yes	yes	yes	no	yes	yes
84-74-2	Di-n-butyl phthalate		0.31 µg/L	0.31 µg/L	ND 1 µg/L				no	yes	yes	yes	yes	yes
117-84-0	Di-n-octyl phthalate		0.35 µg/L	0.35 µg/L					yes	yes	yes	yes	yes	yes
	METALS													
7429-90-5	Aluminum	313 µg/L	862 µg/L	862.00 µg/L	23 - 346 µg/L	100 µg/L	100 µg/L	µg/L	yes	yes	yes	yes	yes	yes
7440-36-0	Antimony	µg/L	3.2 µg/L	3.20 µg/L		3 µg/L		80 µg/L	yes	yes	yes	no	yes	yes
7440-38-2	Arsenic	3.8 µg/L	3.6 µg/L	3.80 µg/L		50 µg/L		148.000 µg/L	yes	no	yes	no	no	no
7440-39-3	Barium	55 µg/L	108 µg/L	108.00 µg/L	23 - 44 µg/L	1,000 µg/L		220 µg/L	yes	no	yes	no	no	no
7440-41-7	Beryllium	0.09 µg/L	0.88 µg/L	0.88 µg/L	0.14 - 0.96 µg/L	11 µg/L	11 µg/L	3.6 µg/L	no	no	no	no	no	no
7440-43-9	Cadmium	30 µg/L	1.2 µg/L	30.00 µg/L		5 µg/L		0.15 µg/L	yes	yes	yes	yes	yes	yes
7440-47-3	Chromium	18 µg/L	1.5 µg/L	18.00 µg/L	ND - 1.40 µg/L	50 µg/L	53 µg/L	42 µg/L	yes	no	no	no	yes	yes
7440-48-4	Cobalt	µg/L	8.6 µg/L	8.60 µg/L		5 µg/L	5 µg/L	24 µg/L	yes	yes	yes	no	yes	yes
7440-50-8	Copper	3.7 µg/L	41 µg/L	41.00 µg/L	ND - 2.50 µg/L	200 µg/L	6 µg/L	1.58 µg/L	yes	no	yes	yes	yes	yes
7439-92-1	Lead	20.6 µg/L	14.8 µg/L	20.60 µg/L		50 µg/L		1.17 µg/L	yes	no	yes	yes	yes	yes
7439-96-5	Manganese	320 µg/L	2020 µg/L	2,020.00 µg/L	105 - 691 µg/L	300 µg/L		µg/L	yes	yes	yes	yes	yes	yes
7439-97-6	Mercury	0.058 µg/L	0.064 µg/L	0.06 µg/L	0.065 - 0.093 µg/L	0.70 µg/L	0.77 µg/L	0.0013 µg/L	no	no	no	yes	yes	yes
7440-02-0	Nickel	µg/L	35.7 µg/L	35.70 µg/L	ND - 6.20 µg/L	100 µg/L		29 µg/L	yes	no	yes	yes	yes	yes
7782-49-2	Selenium	2.6 µg/L	µg/L	2.60 µg/L	µg/L	10 µg/L	4.60 µg/L	5 µg/L	yes	no	no	no	yes	yes
7440-22-4	Silver	µg/L	0.94 µg/L	0.94 µg/L	ND - 0.31 µg/L	50 µg/L	0.10 µg/L	0.12 µg/L	yes	no	yes	yes	yes	yes
7440-62-2	Vanadium	µg/L	4.6 µg/L	4.60 µg/L	ND - 3.40 µg/L	14 µg/L	14 µg/L	12 µg/L	yes	no	no	no	yes	yes
7440-66-6	Zinc	24.3 µg/L	2780 µg/L	2,780.00 µg/L	3.90 - 22 µg/L			65.7 µg/L	yes	yes	yes	yes	yes	yes

ND Not detected
blank cells indicate no value available

Surface Water and Aquatic Habitats

H.3.5 The NEIP site contains surface water resources that include a section of the Black Creek, a small pond, and NYS DEC Wetland V19. Water is discharged from the site to the Black Creek (Galesi Group 2005) via a series of natural drainage ways and man-made ditches.

H.3.6 Within AOC-1, there is a small pond with fringing wetlands (Parsons RI 2006). The center of the pond is characterized by submergent algae bladderwort (*Utricularia spp.*). The fringes of the pond are dominated by emergent marsh plants, including purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), and spike rush (*Eleocharis spp.*) with scattered individuals of woody species including silky dogwood (*Cornus amomum*), red-panicled dogwood (*Cornus stolonifera*), common buckthorn (*Rhamnus cathartica*), wild raisin (*Viburnum nudum*), pussy willow (*Salix discolor*), American elm (*Ulmus americana*), and staghorn sumac (*Rhus typhina*) (Parsons, 2005).

H.3.7 Wildlife present in the wetland areas is likely to be similar to species present elsewhere in terrestrial habitats at the site, and the fringing shrubby species may provide both forage and cover for several species, particularly birds. During the wetland survey, a turtle nest was identified, but the species was unknown. The pond is a man-made structure, and there have been anecdotal reports that fish are present in the pond, although none were observed during the site visit for the qualitative ecological risk assessment.

H.3.8 Other aquatic habitats include the Black Creek, which runs along the eastern boundary of the site, and a drainage swale on the site that drains into the Black Creek. The portion of the Black Creek that is within the site has been classified by NYSDEC as Class C. Class C waters are best used for fishing, and the water quality is suitable for fish propagation and survival (Parsons, 2005). The ecological communities within Black Creek or the drainage swale that drains into Black Creek were not described in the NEIP EIS.

Terrestrial Habitats

H.3.9 The SADVA area has been the subject of an ecological survey as part of an EIS that was prepared for the NEIP (Galesi Group, 2005). As part of the EIS, the general habitats onsite were described. The SADVA area includes a mix of upland deciduous forests, maintained landscape areas, and upland meadows and fields. Other surveys (EA, 1999) have indicated that wetland areas occur in portions of the SADVA.

H.3.10 Upland deciduous forest communities tend to be diverse communities. These communities may include several overstory tree and understory species, including quaking aspen (*Populus tremuloides*), European buckthorn (*Rhamnus cathartica*), grey dogwood (*Cornus racemosa*), grape vine (*Vitis spp.*), Canada goldenrod (*Solidago canadensis*), sugar maple (*Acer saccharum*), box elder (*Acer negundo*), black locust (*Robinia pseudoacacia*), honeysuckle (*Lonicera sp.*), poison ivy (*Toxicodendron radicans*), and Virginia creeper (*Parthenocissus quinquefolia*). The upland deciduous forest communities provide foraging habitat for several songbird and other wildlife species and provide nesting habitat for songbirds and some mammal species (Galesi Group, 2005).

H.3.11 Maintained landscaped areas are generally less diverse, and include areas that have been mowed and/or otherwise maintained areas. The species present include several species of grasses (*Poa spp.*). Wildlife species present are typically those that have adapted to the presence of human activities and these species are generally transient, due to the lack of vegetative cover. The bird species that occur near the maintained landscape areas usually nest in adjacent habitats that provide more cover.

H.3.12 The upland meadows and fields generally contain a mixture of grass species and may provide wildlife habitat, particularly in the transition area from the meadow or field to forested areas. The plant species present may include a mixture of grass species, Queen Anne's Lace (*Daucus carota*), common mullein (*Verbascum thapsus*), Canada goldenrod, birdsfoot trefoil (*Lotus corniculata*), daisy fleabane (*Erigeron annuus*), chicory (*Cichorium intybus*), red clover (*Trifolium pratense*), white clover (*Trifolium repens*), bedstraw species (*Galium spp.*), poison ivy, common milkweed (*Asclepias syriaca*), New York aster (*Aster novi-belgii*), Virginia creeper and butter-and-eggs (*Linaria vulgaris*). These meadow and field areas typically contain many small mammals which in turn are prey items for larger raptors and predators. The transition between the meadows and the upland terrestrial areas provide both nesting and foraging habitat for birds and small mammals, because the food and cover resources are available (Galesi Group, 2005).

H.3.13 Because of the plant diversity and structural diversity of habitats, there are multiple potential habitats for wildlife species to be present. Several bird species are common in the surrounding area and the species that might utilize different portions of the site include mourning dove (*Zenaida macroura*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), northern flicker (*Colaptes auratus*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), American robin (*Turdus migratroius*), northern cardinal (*Cardinalis cardinalis*), eastern towhee (*Pipilo erythrophthalmus*), red-winged blackbird (*Agelaius phoeniceus*), black-capped chickadee (*Poecile atricapillus*), yellow warbler (*Dendroica petechia*), dark-eyed junco (*Junco hyemalis*), red-eyed vireo (*Vireo olivaceus*), white-throated sparrow (*Zonotrichia albicollis*), eastern phoebe (*Sayornis phoebe*), eastern screech owl (*Otus asio*), Cooper's hawk (*Accippiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), wild turkey (*Meleagris gallopavo*), mallard (*Anas platyrhynchos*), great blue heron (*Ardea herodias*), and other common species such as sparrows and finches (Galesi Group, 2005).

H.3.14 Mammals that may occur at the site include white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), eastern chipmunk (*Tamias striatus*), eastern gray squirrel (*Sciurus carolinensis*), woodchuck (*Marmota monax*), eastern cottontail (*Silvilagus floridanus*), Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), white-tailed deer (*Odocoileus virginianus*) and big brown bat (*Eptesicus fuscus*). In addition to these animals, there has been recent evidence that coyotes (*Canis latrans*) may be present in the area, although there have not been confirmed sightings (E. Ashton, Parsons, Personal Observation).

H.3.15 Several reptiles and amphibians may also occur at the site, and include the eastern garter snake (*Thamnophis sirtalis*), eastern milk snake (*Lampropeltis triangulum*), northern water snake (*Nerodia sipedon sipedon*), American toad (*Bufo americanus*), northern spring peeper (*Pseudacris crucifer*), gray tree frog (*Hyla versicolor*), wood frog (*Rana sylvatica*), northern leopard frog (*Rana pipiens*), green frog (*Rana clamitans melanota*), and bull frog (*Rana catesbeiana*).

H.3.16 Federally listed Threatened and Endangered Species that are thought to have suitable habitat at the site include one plant, the blunt-lobe grape fern (*Botrychium oneidense*) and two mammals, the Indiana bat (*Myotis sodalis*), and the small-footed bat (*Myotis leibii*). A survey of the SADVA site (Galesi Group, 2005) for suitable habitat did not identify either the plant or mammal species or the associated habitat for these species, and they are not thought to be present at the site.

Food Webs and Feeding Guilds

H.3.17 The terrestrial communities present at the site represent a terrestrial food web for the potential transfer of COPECs from site soils to food sources and to consumer organisms. Terrestrial food webs are generally composed of four trophic levels and the associated feeding guilds. Feeding guilds are broad groups of related ecological receptors that represent a variety of species potentially exposed to COPECs.

Trophic level 1: Terrestrial plants, including quaking aspen, buckthorn and dogwood trees, associated shrubs and herbaceous plants whose growth depends on soil characteristics and associated micro-fauna.

Trophic level 2: Terrestrial invertebrates, herbivorous mammals (such as small rodents and white-tailed deer), and herbivorous birds (such as mourning dove) that consume primarily plant products, either directly or in the form of debris.

Trophic level 3: Terrestrial omnivorous mammals (such as opossum and skunk) and omnivorous birds (such as robin and red-winged blackbird) consume a mixture of plant material and invertebrates, and in some cases, small vertebrate prey.

Trophic level 4: Terrestrial carnivorous mammals (coyote), carnivorous birds (such as owls and hawks) consume primarily vertebrate prey.

H.3.18 In addition to terrestrial habitats, there are some aquatic habitats present at the site. The food webs of the aquatic sites provide potential transfer of COPECs from sediment to semi-aquatic receptors. Aquatic food webs typically contain four trophic levels.

Trophic level 1: Aquatic plants, both submerged (such as bladderwort) and emergent (such as loosestrife and reed) whose growth depends on the characteristics of the sediment.

Trophic level 2: Aquatic invertebrates and herbivorous birds (such as mallard) rely primarily on plant products for survival. Aquatic-dependent herbivorous mammals (such as muskrats) are not known to occur at the site.

Trophic level 3: Semi-aquatic omnivorous mammals (such as raccoons), omnivorous birds (such as wrens), and omnivorous reptiles and amphibians (such as green frogs, garter snakes) rely on both plant material and invertebrates as food sources.

Trophic level 4: Semi-aquatic carnivorous birds (such as kingfishers, great blue herons) rely almost entirely on vertebrate prey as food sources. No mammalian semi-aquatic carnivores were identified at the site.

Habitat-Specific Receptor Species

H.3.19 To represent different trophic levels within the terrestrial food web and within the semi-aquatic food web, commonly occurring species were selected (Table H.4). The use of commonly occurring species from various trophic levels as ecological receptors is a screening method to determine potential effects on site organisms, and is intended to reduce the uncertainty in the risk analysis. Where potential adverse effects for one receptor are identified, it is assumed that a potential risk can be assumed for other wildlife species having similar diet composition and mobility. Further, the species selected must be receptors that are likely susceptible to the COPECs, and species for whom toxicology data is available.

H.3.20 For the terrestrial food web, one herbivorous mammal (deer mouse), one herbivorous bird (mourning dove), one omnivorous bird (American robin), one carnivorous mammal (coyote) and one carnivorous bird (red-tailed hawk) were identified as potential site-specific receptors.

H.3.21 For the semi-aquatic food web, one herbivorous bird (mallard), one omnivorous mammal (raccoon), one omnivorous bird (marsh wren), one omnivorous amphibian (green frog), one carnivorous bird (belted kingfisher), and one carnivorous reptile (Northern water snake) were identified as potential site-specific receptors.

Table H.4 Selection factors for all species in the qualitative ecological risk assessment for SADVA

SELECTION FACTORS:	**Deer Mouse**	**Mallard**	**Marsh Wren**	**Green frog**	**American Robin**	**Raccoon**	**Red-tailed Hawk**	**Coyote**	**Northern Water Snake**	**Belted Kingfisher**
Terrestrial (T) or Semi-Aquatic (A)	**T**	**A**	**T**	**A**	**T**	**A**	**T**	**T**	**A**	**A**
Trophic Level	**Herbivores**			**Omnivores**				**Carnivores**		
Ecological Factors										
Likely to occur at study area	X	X		X	X	X	X	X	X	X
High trophic level predator (regulates ecosystem structure)							X	X	X	X
Important prey species (seed dispersal)	X	X	X		X					
High potential for exposure based on feeding or life history	X	X	X	X	X	X	X	X	X	X
Susceptible to COPECs biomagnification				X	X	X	X	X	Unknown	X
Risk Evaluation Factors										
Natural history information available	X	X	X	X	X	X	X	X	X	X
Toxicological literature available	X	X	X		X	X	X	X		X
Likely to exhibit toxic effects				X	X	X	X	X		X
Societal Factors										
Species of special conservation concern							X			
High social or recreational value		X	X		X	X	X			X

H.4 ECOLOGICAL CONCEPTUAL SITE MODEL

H.4.1 The ecological conceptual site model (ECSM) for the terrestrial component and aquatic component of the site are presented in Figure 4.1 and Figure 4.2, respectively. Terrestrial receptors are primarily exposed to surface soil and surface water, assuming the ponds and creeks are used for drinking water. Aquatic receptors are primarily exposed to sediment and surface water. For this analysis, exposure to sediment will be important for species that occupy territory near water (*e.g.*, raccoons) but are not fully aquatic (*e.g.*, fish), and hereafter these species are referred to as semi-aquatic species.

H.4.2 Surface soil is a potential exposure medium of concern based on past site activities. Potential chemical transport from soils to sediment near tributaries to the Black Creek, to the Black Creek, or to sediments near the wetland/pond areas on the site may have resulted in the migration of site-related chemicals to associated aquatic habitats. Based on the site characterization and initial data screening, the following potentially complete exposure pathways exist:

- Terrestrial receptor exposure to surface soil; and
- Semi-aquatic receptor exposure to sediment.

Figure 4.1. Ecological Conceptual Site Model of soil to terrestrial receptors

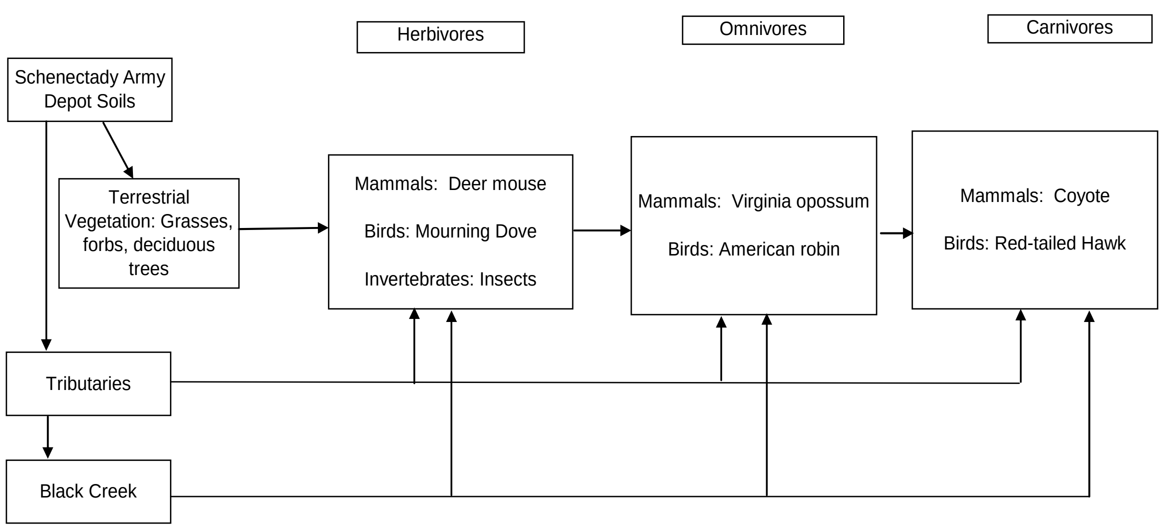
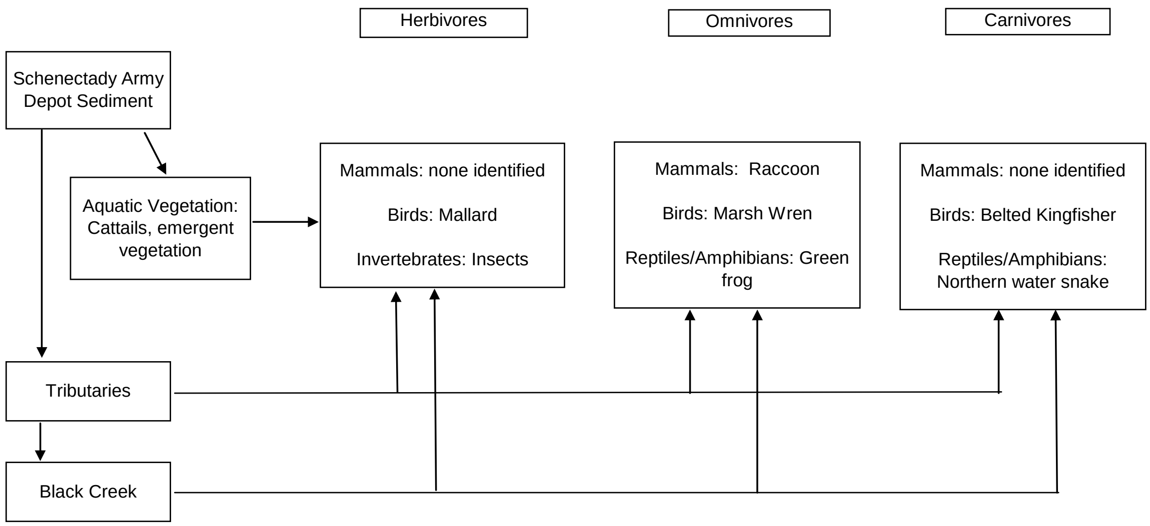


Figure 4.2. Ecological Conceptual Site Model of sediment to semi-aquatic receptors



H.5 COPEC FATE AND TRANSPORT

H.5.1 The qualitative SLERA does not specifically estimate the risk to individual receptors. However, there are several classes of organisms (*e.g.*, aquatic organisms, birds, mammals) that may respond differently to COPECs. Therefore, each COPEC that was included in the analysis after the preliminary screening within each class of COPEC (*i.e.*, VOCs, metals) is addressed and the expected effects on ecological receptors is described. Further, if a COPEC is present in the environment, a qualitative classification of risk (*i.e.*, low, medium, high) has been estimated. The estimated risk values are based on the effects of the chemical, the likelihood that it will remain in the soil, whether it greatly exceeds the USEPA screening values, and if it is bioaccumulative. Table H.5 describes the effects of each COPEC on generalized ecological receptors. Definitions that are relevant to the discussion of effects include:

- Bioaccumulative: This term describes that organisms tend to accumulate the COPEC in their tissues, but excrete it over time.
- Biomagnification: This term describes the tendency to accumulate the COPEC, not excrete the chemical, and concentrate the chemical in tissue. The concentration of the biomagnified COPEC may be several times higher in receptor tissues than in the medium from which the chemical originated.

H.5.2 In general, VOCs pose a low risk to ecological receptors, because the COPECs are dissipated readily in the environment, and they do not bioaccumulate in receptor tissues.

H.5.3 SVOCs include polycyclic aromatic hydrocarbons (PAHs), which may bioaccumulate and biomagnify in receptor tissues. If the receptor ingests a large amount of the medium where the PAHs are present (either soil/sediment directly, or lower trophic level organisms), then there is some risk that the receptors will be affected. Other SVOCs have variable effects, depending on if the compound is bioaccumulative.

Table H.5
COPECs Retained For Qualitative Risk Assessment and the Likely Effects on Different Classes of Ecological Receptors at the Former SADVA

CAS NUMBER	PARAMETER	Exceed Background or USEPA Region 5 Ecological Screening Criteria in which media?			Compound bio-accumulative?	Compound biomagnified?	Availability in Soil/Sediment	General effects on plants	General effects on aquatic species?	General effects on birds?	General effects on mammals?	Probable risk if present (low, medium, high)	References used
	VOCs												
67-64-1	Acetone	soil			No			Acetone rapidly degrades in soil and is not taken up by plants.	Acetone in water does not accumulate in fish tissues	Acetone does not accumulate in bird tissues	Acetone does not accumulate in mammalian tissues	Low	ATSDR, 2007
540-59-0	1,2-dichloroethene (total)	soil			No	No	Evaporates rapidly, does not bind to soil particles.	Because 1,2-dichloroethene does not bind to soil, and evaporates rapidly, it is unlikely to affect plants.	If released to water, will be primarily lost through volatilization, and is unlikely to affect aquatic species.	Because the compound is rapidly volatilized and is not taken up by plants, it is unlikely to afffect birds.	Because the compound is rapidly volatilized and is not taken up by plants, it is unlikely to afffect mammals.	Low	ATSDR, 2007
76-13-1	Freon 113	soil				limited	Does not bind well with soil particles. Has the potential to leach to groundwater.	Effects of Freon on plants is not known	Effect of Freon on aquatic species is not known	Effect of Freon on birds is not known	Effect of Freon on mammals is not known	Low	Fluoride Action Network, 2007
	SEMIVOLATILES												
105-67-9	2,4-Dimethylphenol	soil			limited	no	Water soluble and degrades in water	Plants may bioaccumulate	No known bioaccumulation, but may be toxic at low levels.	No known bioaccumulation	No known bioaccumulation	Low	USEPA, 1980
83-32-9	Acenaphthene		sediment		Yes	no	soluble in water	Fate of acenaphthene in plants is not known	May be toxic in aquatic systems	Fate of acenaphthene in birds is unknown	Fate of acenaphthene in mammals is unknown	Low	USFWS 2002
120-12-7	Anthracene		sediment		yes	no	soluble in water	Fate of anthracene in plants is not known	May be toxic in aquatic systems	Fate of anthracene in birds is unknown	Fate of anthracene in mammals is unknown	Low	USFWS 2002
56-55-3	Benzo(a)anthracene		sediment		Yes	yes	PAHs may stick tightly to soil particles	Plants can bioaccumulate PAHs, but the concentrations are generally lower than the soil concentrations, and may translocate the PAHs to leaf tissue.	Aquatic species will biomagify PAHs.	Terrestrial species will biomagify PAHs.	Terrestrial species will biomagify PAHs. Mammals can absorb by inhalation, dermal contact, and to a lesser degree, ingestion.	Medium, depending on quantities in soil	ATSDR, 2007
50-32-8	Benzo(a)pyrene	soil	sediment		Yes	Yes	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	Medium, depending on quantities in soil	ATSDR, 2007
207-08-9	Benzo(k)fluoranthene		sediment		Yes	Yes	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	Medium, depending on quantities in soil	ATSDR, 2007
65-85-0	Benzoic acid	soil			limited	No	When released to soil, may leach to groundwater. It is expected to rapidly degrade in soil.	The fate of benzoic acid in plants is unknown	When released to water, it is expected to rapidly degrade, but may have some effects on aquatic systems including fish mortality.	The fate of benzoic acid in birds is unknown	The fate of benzoic acid in mammals is unknown	Low	Pesticides database, 2007
117-81-7	bis(2-ethylhexyl) phthalate	soil	sediment	surface water	No	No	Strong adsorption to soil and sediment particles. Further, it has a high lipid solubility, but is rapidly metabolized and excreted.	Even at high concentrations, there are no effects on plants.	May be toxic to many aquatic species, particularly algae.	No known effects on birds	The fate of bis(2-ethylhexyl) phthalate in mammals is not available.	Low	Drew and Frangos, 2001
86-74-8	Carbazole	soil	sediment		limited	No	soluble in water	The fate of carbazole in plants is unknown	May be toxic for aquatic systems. May bioaccumulate in zooplankton.	The fate of carbazole in birds is unknown	The fate of carbazole in mammals is unknown	Low	Pesticides database, 2007
218-01-9	Chrysene		sediment		Yes	Yes	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	Medium, depending on quantities in soil	ATSDR, 2007
132-64-9	Dibenzofuran	soil			No	no	soluble in water	The fate of dibenzofuran in plants is unknown	May be toxic for aquatic systems.	The fate of dibenzofuran in birds is unknown	The fate of dibenzofuran in mammals is unknown	Low	Pesticides database, 2007
53-70-3	Dibenz(a,h)anthracene		sediment		Yes	Yes	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene		ATSDR, 2007
84-74-2	Di-n-butyl phthalate	soil			No	No	Water soluble. Soil and water bacteria break down di-n-butyl phthalate	May cause phytotoxicity in plants. Growth and germination were reduced.	May be toxic to many aquatic species, particularly algae.	No known effects on birds	The fate of di-n-butyl phthalate in mammals is not available.	Low	ATSDR, 2007; Drew and Frangos, 2001
117-84-0	Di-n-octyl phthalate			surface water	No	No	see Di-n-butyl phthalate					Low	

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105-67-9	2,4-Dimethylphenol	soil			No	No	Water soluble. Adsortion to sediment and soil particles is limited, and biodegrades within days.	Generally removed from soil through biodegradatiion, and there is no evidence of uptake by plants.	Will degrade in water within hours to days. Bioconcentration in fish is not significant.	The effects of 2,4-dimethylphenol on birds is not documented, but would be expected to be low to to biodegradation.	The effects of 2,4-dimethylphenol on mammals is not documented, but would be expected to be low to to biodegradation.	Low	Spectrum Labs, 2007
206-44-0	Fluoranthene		sediment		Yes	Yes	Fluoranthene is nearly insoluble in water, but it is not known if it will bind to soil and sediment particles.	The effects of fluoranthene on plants is not known, but may be taken up by plant roots.	Nearly insoluble in water, and may be taken up by aquatic species through dermal absorption	The effects of fluoranthene on birds is not known.	The effects of fluoranthene on mammals is not known.	Medium, depending on quantities in soil	ATSDR, 2007
86-73-7	Fluorene		sediment		Yes	Yes	Fluorene is nearly insoluble in water, but it is not known if it will bind to soil and sediment particles.	The effects of fluorene on plants is not known, but may be taken up by plant roots.	Nearly insoluble in water, and may be taken up by aquatic species through dermal absorption	The effects of fluorene on birds is not known.	The effects of fluorene on mammals is not known.	Medium, depending on quantities in soil	ATSDR, 2007
193-39-5	Indeno(1,2,3-cd)pyrene		sediment		Yes	Yes	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	See Benzo(a)anthracene	Medium, depending on quantities in soil	ATSDR,2007
91-57-6	2-Methylnaphthalene		sediment		No	No	See Naththalene					Low	
91-20-3	Naphthalene	soil	sediment		No	No	May be weakly adsorbed to soil particles, but rapidly evaporates when in contact with air.	Natphthalene is generally not taken up by plants.	Levels in water tend to be low, except at a point discharge. Therefore, the effects on aquatic species is expected to be low.	The effects of naphthalene on birds is not known, but given that it evaporates rapidly, it is not expected to affect birds.	The effects of naphthalene on mammals is not known, but given that it evaporates rapidly, it is not expected to affect mammals.	Low	ATSDR, 2007
87-86-5	Pentachlorophenol	soil			No	Moderate	Will adsorb to soil and sediment particles. May leach to groundwater	General uses are as an herbicide, so will be toxic to some plants.	Biodegradation in water may occur, but has been marketed as a molluscide, which suggests toxicity to aquatic species.	The fate of Pentachlorophenol in birds is not known.	The fate of Pentachlorophenol in mammals is not known.	Medium, because no longer manufactured in U.S.	Spectrum Labs, 2007
85-01-8	Phenanthrene		sediment		yes	no	soluble in water	Fate of phenanthrene in plants is not known	May be toxic in aquatic systems	Fate of phenanthrene in birds is unknown	Fate of pheanthrene in mammals is unknown	Low	USFWS 2002
129-00-0	Pyrene		sediment		yes	no	soluble in water	Fate of pyrene in plants is not known	May be toxic in aquatic systems	Fate of pyrene in birds is unknown	Fate of pyrene in mammals is unknown	Low	USFWS 2002
	PESTICIDES/PCBs												
72-54-8	4,4'-DDD	soil	sediment		Yes	Yes	DDD is a breakdown product of DDT. See DDT for additional information.	See DDT	See DDT	See DDT	See DDT	High. Although the use of DDT has been discontinued in the US, it is very persistent in soils.	ATSDR, 2007; USEPA 1999
72-55-9	4,4'-DDE	soil	sediment		Yes	Yes	DDE is a breakdown product of DDT. See DDT for additional information.	See DDT	DDE is very persistent in aquatic environments and is highly soluble in lipids. See also DDT.	See DDT	See DDT	High. Although the use of DDT has been discontinued in the US, it is very persistent in soils.	ATSDR, 2007; USEPA, 1999
50-29-3	4,4'-DDT	soil	sediment		Yes	Yes	DDT binds to soil and sediment particles.	DDT will accumulate in plant tissues.	In aquatic ecosystems, DDT will biomagnify in higher concentrations in fattier fish occupying high trophic levels than in leaner species occupying lower trophic levels. Toxic to many types of aquatic organisms even at low concentrations.	In terrestrial ecosystems, DDT will biomagnify in higher concentrations in adipose tissues of birds occupying high trophic levels.	In terrestrial ecosystems, DDT will biomagnify in higher concentrations in adipose tissues of mammals occupying high trophic levels.	High. Although the use of DDT has been discontinued in the US, it is very persistent in soils.	ATSDR, 2007; USEPA, 1999, USEPA, 2007
5103-71-9	alpha-Chlordane		sediment		yes	Yes	In soil, Chlordane attaches strongly to particles in the upper layers of soil; some is lost from soil through evaporation.	At least some uptake by plants is expected, but not documented	Accumulates in fatty tissues of fish. Some may be excreted.	Accumulates in fatty tissues of birds, some may be excreted.	Accumulates in fatty tissues of mammals. Some may be excreted.	Medium	ATSDR, 2007

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12789-03-6	gamma-Chlordane		sediment		Yes	Yes	See alpha-Chlordane	See alpha-Chlordane	See alpha-Chlordane	See alpha-Chlordane	See alpha-Chlordane	Medium	ATSDR, 2007
11097-69-1	Aroclor 1254		sediment		Yes	Yes	PCBs cycle easily between air, water, and soil. PCBs stick to soil particles and will not usually be carried deep into the soil via rainwater.	In the gaseous form, PCBs can bioaccumulate in aboveground plant tissues	PCBs are taken up in the bodies of fish, and are biomagnified in higher trophic levels. Effects of PCBs may include reduced egg survival and fertilization, or complete reproductive failure.	PCBs are taken up in the bodies of birds, and are biomagnified in higher trophic levels. Toxic effects in birds include morbidity, tremors, muscular in-coordination, and hemorrhagic areas in the liver. May also include reproductive problems.	PCBs are taken up in the bodies of mammals, and are biomagnified in higher trophic levels. Toxic effects may include anorexia, weight loss, and lethargy, reproductive failures, and altered behavioral patterns.	High, due to the persistence in the environment	ATSDR, 2007; USEPA 2007
11096-82-5	Aroclor 1260	soil			Yes	Yes	See Aroclor 1254					High, due to the persistence in the environment	
959-99-8	Endosulfan I		sediment		Yes	Yes	Endosulfan attaches to soil particles. Endosulfan does not readily dissolve in water, and is attached to sediment particles.	Endosulfan on most crop plants generally breaks down within a few weeks.	Endosulfan is bioaccumulated in aquatic species, and biomagnified in aquatic species.	The fate of Endosulfan in terrestrial food chains is not available.	The fate of Endosulfan in terrestrial food chains is not available.	Medium	ATSDR, 2007
72-20-8	Endrin	soil	sediment		Yes	No	Endrin does not dissolve well in water, is generally bound to soil and sediment particles.	Plants may accumulate Endrin in the tissues.	Endrin can bioaccumulate in tissues of aquatic species.	Endrin was developed as a pesticide to kill birds, therefore is toxic.	Endrin was developed as a pesticide to kill rodents, therefore is toxic.	Medium, because the use of Endrin has been discontinued	ATSDR, 2007; USEPA 1999
76-44-8	Heptachlor		sediment		Yes	Yes	Heptachlor does not dissolve well in water, may bind tightly to soil particles.	Plants may accumulate Heptachlor in the tissues.	Heptachlor may persist in soil and water for many years. Heptachlor is toxic to many aquatic organisms.	Heptachlor has generally low toxicity to birds, but will biomagnify in fatty tissues.	Heptachlor and Heptachlor epoxide tend to biomagnify in fatty tisses, especially liver.	High, due to the persistence in the environment	ATSDR, 2007
1024-57-3	Heptachlor epoxide		sediment		Yes	Yes	Heptachlor epoxide dissolves in water more readily than Heptachlor; will bind tightly to soil particles.	Plants may accumulate Heptachlor epoxide in the tissues.	Heptachlor epoxide may persist in soil and water for many years. Heptachlor is toxic to many aquatic organisms.	Heptaclor is converted to Heptachlor epoxide in the liver, and may bioconcentrate in fatty tissues.	Heptachlor and Heptachlor epoxide tend to biomagnify in fatty tisses, especially liver.	High, due to the persistence in the environment	ATSDR, 2007
	METALS												
7429-90-5	Aluminum			surface water	Yes	Not known	Aluminum adsorbs to suspended solids and sediment. Soils with greater mineral content result is lower soil mobility of Aluminum.	Aluminum is taken up by plants and stored in root tissues in some species. Bioaccumulation in roots and transport to leaves varies by species.	Aluminum bioconcentrates in aquatic species. Fish are more sensitive to aluminum toxicity than aquatic invertebrates, causing developmental problems.	No information on the fate of Aluminum in birds is available	Adsorbed Aluminum is excreted primarily through the kidneys.	Medium	ATSDR, 2007; USEPA 1999; USEPA, 2007
7440-36-0	Antimony	soil	sediment		Yes, in aquatic organisms	No	Antimony binds to soil and particulates.	Antimony is taken up by plants following surface deposition, and soil uptake is dependent on the solubility	Antimony bioconcentrates in aquatic species	Antimony does not biomagnify in terrestrial food chains. No information on the fate of Antimony in birds is available.	Antimony does not biomagnify in terrestrial food chains. Antimony is excreted in urine and feces.	Medium	USEPA, 1999

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7440-38-2	Arsenic		sediment			Minimal	Generally tightly bound in soil. Arsenic in soil is directly taken up by soil fauna and invertebrates. Arsenic bioconcentration in soil invertebrates is low.	Arsenic in soil is directly taken up by plant roots, but not readily transported to aboveground tissue. In plants, arsenic may cause wilting, chlorosis, browning, dehydration, and inhibition of light activation.	Arsenic bioconcentration in aquatic organisms is low, because arsenic is rapidly metabolized and excreted. Biomagnification does not readily occur in aquatic food chains. Toxicity effects are more prevalent in aquatic bottom feeders.	Absorption studies for arsenic specific to avian species are not available. Tolerance to arsenic varies by species, but effects may include developmental, behavioral, and reproductive problems.	Arsenic is indirectly taken up via ingestion. Oral absorption efficiency is dependent on the form of arsenic, its solubility, and media. Compounds in aqueous solution are more readily absorbed than insoluble compounds. Arsenic is rapidly metabolized in mammals and does not readily bioaccumulate in mammals. Chronic exposure may cause fatigue, gastrointestinal distress, and possible genetic mutation.	Low	USEPA, 1999; USEPA, 2007
7440-39-3	Barium	soil	sediment		No	No	Soluble compounds usually do not last in the environment. The barium in these compounds combine with sulfate or carbonate and become longer lasting forms. If the latter forms are released onto land, they combine with soil particles.	None known	None known	None known	Elevated levels of barium may cause a wide range of effects in mammals, including gastrointestinal distress, muscular paralysis, and cardiovascular effects.	Low	ATSDR, 2007; USEPA, 2007
7440-41-7	Beryllium	soil	sediment		No	No	Beryllium has limited solubility and mobility in sediment and soil.	Beryllium is taken up by plants in roots, but lower concentrations are present in the stems and foliage	Beryllium does not bioconcentrate in aquatic organisms, but can be toxic to warm water fish. Biomagnification in aquatic food chains does not occur.	No information on the fate of Beryllium in birds is available	Beryllium is poorly adsorbed from the gastrointestinal tract, but may be absorbed through inhalation. Beryllium is generally excreted.	Low	USEPA, 1999
7440-43-9	Cadmium	soil	sediment	surface water	Yes	Higher biomagnification in aquatic organisms than terrestrial organisms	Cadmium compounds in soil are stable. Precipitation and sorption to mineral surfaces and organic materials re important removal processes, and Cadmium concentrations are generally higher in sediment than in overlying water.	Some forms of Cadmium can be taken up by plants. Cadmium can be toxic to plants at lower soil concentrations than other heavy metals, and is more readily taken up by roots than other metals.	Freshwater biota and sensitive to cadmium exposure, with toxicity a possibility. Cadmium bioaccumulates in aquatic organisms.	No information on the fate of Cadmium in birds is available.	Cadmium may be retained in body tissues for long periods of time (years), and may cause renal toxicity. Cadmium is highly toxic to wildlife.	Medium	ATSDR, 2007; USEPA, 1999; USEPA, 2007

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7440-47-3	Chromium	soil	sediment	surface water	Yes	No	In soils, Chromium is primarily in the form of insoluble oxides with limited mobility. In sediments and surface water, Chromium may in the soluble state or attached to organic suspended solids.	Chromium is taken up by plant roots, but not readily transported to stems and foliage. Primarily affects aquatic biota.	Bioaccumulation occurs in aquatic species; biomagnification does not occur in aquatic food chains. There are a wide range of adverse effects in aquatic organisms, including reduced growth and morphological changes.	Because most Chromium is bound to soil or sediment particles, there is no evidence that birds will accumulate Chromium in their tissues.	Because most Chromium is bound to soil or sediment particles, there is no evidence that mammals will accumulate Chromium in their tissues.	Low	ATSDR, 2007; USEPA, 2007
18540-29-9	Chromium VI	soil			yes	No	See Chromium				Chromium +6 is readily converted to chromium +3 in animals.	Low	USEPA 2007
7440-48-4	Cobalt	soil			Yes	No	Cobalt is generally tightly bound to soil or sediment particles.	Plants can accumulate small amounts of cobalt from the soil, especially in the aboveground edible tissues (*e.g.* fruit, grain, and seeds).	Animals that eat plants that contain cobalt will bioaccumulate cobalt, but cobalt is not known to biomagnify in aquatic food chains.	Animals that eat plants that contain cobalt will bioaccumulate cobalt, but cobalt is not known to biomagnify in terrestrial food chains.	Animals that eat plants that contain cobalt will bioaccumulate cobalt, but cobalt is not known to biomagnify in terrestrial food chains.	Low	ATSDR, 2007
7440-50-8	Copper	soil	sediment	surface water	Yes	No	Copper generally binds to soils and sediment particles.	Plants may accumulate copper, and copper may inhibit photosynthesis.	Copper bioconcentrates in aquatic species. Copper does not biomagnify in aquatic food chains. Highly toxic in aquatic ecosystems.	Toxic effects of copper in birds include reduced growth rates, lowered egg production and developmental abnormalities.	Copper does not bioaccumulate in mammals and is excreted primarily in the bile. Mammals are not as sensitive to copper toxicity as aquatic organisms, but toxic effects may include liver cirrhosis, necrosis in kidneys and the brain, gastrointestinal distress.	Low	USEPA, 1999; USEPA, 2007
7439-92-1	Lead	soil	sediment	surface water	Yes	No	Lead is strongly bound to soil particles. Lead partitions primarily to sediments.	Plants can accumulate lead it the tissues. At elevated levels in plants, lead can cause reduced growth, photosynthesis and water absorption.	Some soils may be transported to rivers and lakes via rainfall, where contaminated sediments may be eaten by aquatic organisms. Fish exposed to lead may have growth, reproductive problems and paralysis.	Lead may bioaccumulate in birds. If birds eat contaminated plants or animals, most of the lead will be excreted. Lead poisoning may damage the nervous system, kidneys, liver, reproduction.	Lead may bioaccumulate in mammals. If mammals eat contaminated plants or animals, most of the lead will be excreted. Lead poisoning may damage the nervous system, kidneys, liver, reproduction.	Medium	ATSDR, 2007; USEPA, 2007
7439-96-5	Manganese	soil	sediment	surface water	Unknown	No				Elevated levels of manganese may cause decreased hemoglobin, anemia, reduced growth	Elevated levels of manganese in mammals may alter brain chemistry, cause gastrointestinal distress, low birth weights and developmental delays.	Medium	ATSDR, 2007; USEPA, 2007
7439-97-6	Mercury	soil	sediment	surface water (because of bioaccumulation)	Yes	Yes	Mercury generally stays on the surface of sediment or soil particles.	Plants do not generally accumulate mercury in the tissues, even when grown in contaminated soils.	Mercury bioaccumulates in tissues of lower trophic level aquatic organisms, and biomagnifies in tissues of higher trophic level organisms. Effects of mercury in fish and amphibians include inhibition of metamorphosis, brain lesions, growth, behavior and reproduction	Mercury bioaccumulates in tissues of lower trophic level terrestrial organisms, and biomagnifies in tissues of higher trophic level organisms. Effects of mercury on birds may include reduced fertility, reduced survivability and growth of young	Mercury bioaccumulates in tissues of lower trophic level terrestrial organisms, and biomagnifies in tissues of higher trophic level organisms. Effects of mercury on mammals includes ataxia, tremors, and diminished movement coordination, and reproductive and neurological effects.	Medium, due to the toxicity of Mercury	ATSDR, 2007; USEPA, 1999; USEPA, 2007
7440-02-0	Nickel	soil	sediment	surface water	Yes	No	Nickel strongly attaches to soil or sediment particles containing iron or manganese.	Some plants can accumulate nickel.	Nickel does not appear to concentrate in fish species Effects may include genotoxicity and growth reduction.	The fate of nickel in birds is not available	Nickel does not bioaccumulate in small mammals living where there is contaminated soil.	Low	ATSDR, 2007; USEPA, 2007

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COPECs Retained For Qualitative Risk Assessment and the Likely Effects on Different Classes of Ecological Receptors at the Former SADVA

CAS NUMBER	PARAMETER	Exceed Background or USEPA Region 5 Ecological Screening Criteria in which media?			Compound bio-accumulative?	Compound biomagnified?	Availability in Soil/Sediment	General effects on plants	General effects on aquatic species?	General effects on birds?	General effects on mammals?	Probable risk if present (low, medium, high)	References used
7782-49-2	Selenium	soil	sediment		Yes	Yes	Elemental selenium cannot dissolve in water will generally remain in soil. Selenium compounds that are water soluble are more mobile.	Selenium may be bioaccumulated by plants, but there is not evidence to support this.	Aquatic species can bioaccumulate selenium, and higher trophic levels may biomagnify selenium. Selenium may cause growth reduction in aquatic algae. In other aquatic organisms, loss of equilibrium and other neurological disorders, liver damage, reproductive failure,	The fate of Selenium in birds is not known.	The fate of Selenium in terrestrial mammals is not known.	Medium	ATSDR, 2007; USEPA, 2007
7440-22-4	Silver		sediment	surface water	Yes	Yes, in some aquatic invertebrates		There are some indications of silver toxicity in plants.	Silver is highly toxic to aquatic organisms. Elevated levels can cause larval mortality, developmental abnormalities, reduced growth rates, and reduced reproduction.	The fate of silver in birds is not known.	Toxic effects of silver in mammals includes pulmonary edema, congestion, and mortality	medium	USEPA, 2007
7440-28-0	Thallium	soil			Yes	Yes	Thallium adsorbs to soil and sediment.	Thallium is taken up by plant roots, and thallium may inhibit chlorophyll production.	Thallium bioaccumulates in aquatic organisms, and may biomagnify in the higher trophic levels. Thallium may cause reductions in larval fish growth and percent embryo hatchability and mortality.	Thallium bioaccumulates in terrestrial organisms, and may biomagnify in the higher trophic levels. Some will be excreted in urine.	Thallium bioaccumulates in terrestrial organisms, and may biomagnify in the higher trophic levels. Some will be excreted in urine.	Medium	ATSDR, 2007; USEPA, 1999
7440-62-2	Vanadium	soil	sediment		Yes	No	Naturally found in soils and rocks.	Vanadium may be taken up by plants.	Vanadium may be bioaccumulated by aquatic organisms	Birds may be exposed to vanadium through ingestions, but the direct effects of vanadium have not been documented.	Mammals may be exposed to vanadium through ingestions, but the direct effects of vanadium have not been documented.	Low	ATSDR, 2007
7440-66-6	Zinc	soil	sediment	surface water	Yes	No	Zinc in soil is bound to soil particles and does not dissolve in water. If zinc is in the surface water, may be transported to groundwater.	Zinc is toxic to plants at elevated levels, and reduces growth, survival, and reproduction.	Fish can bioaccumulate zinc in body tissues. Zinc in aquatic systems tends to be partitioned into sediment, but growth, survival and reproduction in aquatic organisms may be affected.	Birds can bioaccumulate zinc in body tissues. Elevated zinc levels in birds can cause mortality, pancreatic degradation, reduced growth.	Low can bioaccumulate zinc in body tissues. Elevated levels of zinc in mammals may cause cardiovascular, development, immunological, liver and kidney problems and reproductive problems.	Low	ATSDR, 2007; USEPA, 2007

References:

ATSDR, 2007. Agency for Toxic Substnaces and Disease Registry. Department of Health and Human Services.

Fluoride Action Network, 2007. Available at: http://fluoridealert.org/pesticides/effects.environmental.q-z.htm Accessed

USFWS, 2002. Bioavailability and Exposure Assessment of Petroleum Hydrocarbonds and Trace Elemants in Birds Nesting Near the North Platte River, Casper, Wyoming. Available at:

Drew and Frangos, 2001. Data Collation and Review of Ecological Effects of Phthalates. Prepared for Australian

Spectrum Labs, 2007. Spectrum Labs. Available at: http://www.speclab.com/. Accessed January, 2007.

Pesticides database, 2007. Available at:

USEPA, 1999. Screenng Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities.

USEPA, 2007. Ecological Risk Assessment and the Ecological Technical Center. Toxicology Profiles. Available at:

USEPA, 1980. Ambient Water quality Criteria for 2,4-dimethylphenol. U.S. Environmental Protection Agency, EPA

H.5.4 Pesticides and PCBs are often both bioaccumlative and biomagnified in terrestrial and aquatic food chains. Many of the pesticides are no longer used in the U.S., but are very persistent in the soil/sediment, and therefore may still be affecting ecological receptors, depending on the soil/sediment concentrations. Because of the persistence in the environment of some pesticides, the risk to ecological receptors is considered high.

H.5.5 Metals in soil/sediment have variable effects on ecological receptors. Metals that do not bioaccumulate or biomagnify pose low ecological risk. Metals that bioaccumulate but do not biomagnify pose low ecological risk. Metals that biomagnify pose at least medium levels of ecological risk, and depend in large part on how the metals bind to soil particles.

H.6 CONCLUSIONS

The COPECs that were detected at the site and are considered to pose various levels of potential risk to ecological receptors are summarized on Table H.6. Although there are chemicals in various media onsite that pose a high risk to aquatic and terrestrial wildlife, the former SADVA site appears to support wildlife typical for the area and for the commercial/industrial setting that the site has retained for over 60 years. These conclusions are reinforced by two other ecological assessments conducted at AOC 1. The 2004 qualitative assessment of the diversity and condition of aquatic life in the pond found that the observed species composition seemed appropriate for the habitat and all species present appeared active. The 2004 macroinvertebrate community analysis of the pond found the sampling stations were slightly impaired, due to the monotonous nature of the man-made pond.

Table H.6 Summary of COPECs, Risk Levels and Locations Where Present at SADVA

	LOW RISK	Present in AOCs	MEDIUM RISK	Present in AOCs	HIGH RISK	Present in AOCs
VOCs	Acetone	1/7, 2, 8				
	1,2-dichloroethene (total)	1/7				
	Freon 113	2				
SVOCs	2,4-Dimethylphenol	1/7	Benzo(a)anthracene	1/7, 6, 8, 9		
	Acenaphthene	1/7, 3, 8, 9	Benzo(a)pyrene	1/7, 2, 8		
	Anthracene	1/7, 2, 3, 8, 9	Benzo(k)fluoranthene	1/7, 2, 6, 8, 9		
	Benzoic acid	3	Dibenz(a,h)anthracene	1/7, 6, 8		
	bis(2-ethylhexyl)phthalate	1/7, 2, 3, 8, 9	Fluoranthene	1/7, 2,6, 8, 9		
	Carbazole	1/7, 8	Fluorene	1/7, 2, 3, 8, 9		
	Chrysene	1/7, 2, 3, 6, 8, 9	Indeno(1,2,3-cd)pyrene	1/7, 6, 8		
	Dibenzofuran	1/7, 3, 8, 9	Pentachlorophenol	3		
	Di-n-butyl phthalate	1/7, 2,8				
	Di-n-octyl phthalate	2, 8				
	2-Methylnaphthalene	1/7, 2, 3, 9				
	Naphthalene	1/7, 2, 3, 6, 8				
	Phenanthrene	1/7, 2, 3, 6, 8, 9				
	Pyrene	1/7, 2, 3, 6, 8, 9				
PESTICIDES/ PCBs			alpha-Chlordane	2, 6, 8	4,4'-DDD	1/7, 2, 3, 6, 8
			gamma-Chlordane	1/7, 2, 8	4,4'-DDE	1/7, 2, 3, 6, 8
			Endosulfan I	1/7	4,4'-DDT	1/7, 2, 3, 6, 8
			Endrin	1/7, 2, 8	Aroclor 1254	1/7, 8
					Aroclor 1260	1/7
					Heptachlor	2
					Heptachlor epoxide	8
METALS	Arsenic	1/7, 2, 3, 5, 6, 8, 9	Aluminum	1/7, 2, 3, 5, 6, 8, 9		
	Barium	1/7, 2, 3, 5, 6, 8, 9	Antimony	1/7, 2, 3, 5, 6, 8, 9		
	Beryllium	1/7, 2, 3, 5, 6, 8, 9	Cadmium	1/7, 2, 3, 5, 6, 8, 9		
	Chromium	1/7, 2, 3, 5, 6, 8, 9	Lead	1/7, 2, 3, 5, 6, 8, 9		
	Chromium VI	1/7	Manganese	1/7, 2, 3, 5, 6, 8, 9		
	Cobalt	1/7, 2, 3, 5, 6, 8, 9	Mercury	1/7, 2, 3, 5, 6, 8, 9		
	Copper	1/7, 2, 3, 5, 6, 8, 9	Selenium	1/7, 2, 3, 5, 6, 9		
	Nickel	1/7, 2, 3, 5, 6, 8, 9	Silver	1/7, 2, 3, 5, 6, 8, 9		
	Vanadium	1/7, 2, 3, 5, 6, 8, 9	Thallium	1/7, 2, 3, 5, 6, 8, 9		
	Zinc	1/7, 2, 3, 5, 6, 8, 9				

H.7 REFERENCES

ATSDR, 2007. Agency for Toxic Substnaces and Disease Registry. Department of Health and Human Services. Available at: http://www.atsdr.cdc.gov/ Accessed March, 2007.

Drew and Frangos, 2001. Data Collation and Review of Ecological Effects of Phthalates. Prepared for Australian Vinyls Corporation. Prepared by R. Drew, J. Fangos, Toxikos Pty Ltd.

EA, 1999. *Revised Draft Investigation Report – Wetlands Identification and Delineation, Former Schenectady Army Depot – Voorheesville Area*, prepared by EA Engineering, Science and technology dated June 23, 1999.

Fluoride Action Network, 2007. Available at: http://fluoridealert.org/pesticides/effects.environmental.q-z.htm Accessed March, 2007.

Galesi Group 2005**.** Draft Generic Environmental Impact Statement, Northeastern Industrial Park, June 2005

Malcolm Pirnie, 1997. Final Limited Remedial Investigation Report. Former Voorheesville Army Depot, U.S. Army Southern Disposal Landfill, Guilderland, New York, April 1997.

Parsons, 2007. Remedial Investigation at the Former Schenectady Army Depot – Voorheesville Area, Guilderland, New York. Prepared for U.S. Army Corps of Engineers, March, 2007.

Pesticides database, 2007. Available at: http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC35270#Ecotoxicity Accessed January, 2007.

Spectrum Labs, 2007. Spectrum Labs. Available at: http://www.speclab.com/. Accessed January, 2007.

USDA Soil Conservation Service, 1992. Soil Survey of Albany County, New York.

USEPA, 1980. Ambient Water quality Criteria for 2,4-dimethylphenol. U.S. Environmental Protection Agency, EPA 440.5-80 044, October 1980.

USEPA, 1988. *Guidelines for Ecological Risk Assessment* Final. EPA 630-R-95-002F. April, 1998.

USEPA, 1999. Screenng Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Appendix H, Toxicological Profiles. U.S. Environmental Protection Agency, August, 1999.

USEPA, 2007. Ecological Risk Assessment and the Ecological Technical Center. Toxicology Profiles. Available at: http://www.epa.gov/region5superfund/ecology/html/toxprofiles.htm. Accessed March 2007.

USFWS, 2002. Bioavailability and Exposure Assessment of Petroleum Hydrocarbonds and Trace Elements in Birds Nesting Near the North Platte River, Casper, Wyoming. Available at: http://www.r6.fws.gov/contaminants/papers/r6716c00.pdf.