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August 5, 1993
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Ms. Carla Struble
United States Environmental Protection Agency
Room 2930
Federal Plaza
New York, New York 10278

SUBJECT: **Seneca Army Depot - OB Grounds RI/FS**
Development of the Potential of Chemicals of Concern for use in the Human Health Risk Assessment

Dear Ms. Struble:

Since the Phase 2 fieldwork at the Open Burning (OB) Ground site is complete, Engineering-Science (ES) has begun the process of preparing the baseline human health risk assessment. The purpose of this letter is to update you as to the initial steps that have been taken in preparing this document and to receive concurrence with the approach taken. Much of this letter highlights the process of developing the potential chemicals of concern that will be used in the quantification of the human health risk at this site. The list of chemicals used to establish this database includes volatile organic compounds, semi-volatile organic compounds, PCB/pesticides, explosives and inorganic metals, comprising a total of approximately 200 organic and inorganic analytes. Following the analytical protocols established by the New York State Department of Environmental Conservation (NYSDEC), the presence of these analytes were quantitatively determined in groundwater, surface water, sediment and soils on and around the OB ground during the Phase 1 and Phase 2 Remedial Investigation (RI) fieldwork. Since validation of the entire database is complete, the initial steps of the risk assessment process have begun. These steps involve the evaluation of the data to reduce the number of analytes to include those constituents which contribute most significantly to the site risk. This final list of constituents will then provide the basis for the quantification of human health risk. This letter describes the procedures that ES has used to perform this evaluation. These procedures obtained from the EPA guidance document "Risk Assessment Guidance for Superfund, (RAGS), Volume 1, Human Health Evaluation Manual (Part A), EPA/540/1-89/002. All decisions made regarding the selection of potential chemicals of concern were consistent with this EPA guidance document.

The initial reduction in the list of analytes consisted of eliminating the compounds that were not detected in any sample for a media. Section 5.3.5 of RAGS provided guidance for this step. This process involved inspection of the data and the associated data qualifiers. Data flagged as a "J", an estimated value, was considered to be a real value. Data flagged as a "U", an undetected value, or an "R", a rejected datapoint, were considered as a non-detected value. If no qualifier was found then the value was considered to be a valid point. An analyte was eliminated only if all the samples for that media were non-detects. In other words, each sample had to be either a "U" or an "R". The results of this database inspection are summarized in Tables 1A through 1D for each specific media.

The second step in the reduction of the list of analytes was to eliminate those constituents that, even though they were detected at the site, were shown to be statistically the same as the background dataset. This analysis was only applied to the inorganics in soil. Although anthropogenic organics in soil, such as the Polynuclear Aromatic Hydrocarbons (PAHs), were detected in background soil, to be conservative this analysis only considered inorganics. The statistical test used to compare the on-site soil concentration dataset with the background concentration dataset was the Student's t-Test. Since the t-Test analysis assumes a normal data distribution, the first step in the statistical comparison of the data was to determine the distribution of the data. This was done by calculating the Coefficient of Variation (CV) for each analyte in the dataset. The CV was calculated as the ratio of the Standard Deviation (S) to the Average (X). If the value obtained following this analysis was greater than 1 then the database was considered to be non-Normally distributed and the dataset was log-transformed. The log-transformed data was then checked for normality.

Guidance is currently not available for performing the dataset comparison between background and site soils, however, guidance is available for comparisons for groundwater datasets. The basis for this statistical comparison was obtained from the EPA guidance document "Groundwater Monitoring Guidance for Owners and Operators of Interim Status Facilities". The analysis involved the calculation of the t-statistic (t) followed by a comparison of this value with the t-statistic for a given confidence interval and degree of freedom. The t-statistic used for comparison is available in numerous statistical textbooks. The t-statistic used for comparison with the calculated t-statistic was obtained for the 99% confidence level. The degrees of freedom is simply the number of measurements minus one. Using these two parameters, a t-statistic was obtained from a table of t-statistics. For soil, the number of measurements was large, i.e. between 140 and 250, and because the number of measurements was large, the t-statistic did not change significantly over the range of measurements. A t-statistic of 2.59 was used for comparison with all the calculated t values. Therefore, if the calculated site t value was less than 2.59, it was concluded that there was no statistically significant difference, at the 99% confidence level, between the on-site dataset and the background dataset and that particular inorganic constituent was eliminated from further consideration in the risk analysis. Table 2 presents the results of this statistical analysis. Section 5.7 of RAGS provided the guidance for this analysis.

Tables 3A, 3B, 3C and 3D present the results from these first two steps for each media. These are the lists of analytes on which the human health risk assessment will be performed. No additional analyte is being eliminated from the human health risk assessment, however, the database was further evaluated, in order to determine which constituents contribute the majority of the site risk. The reason for this step is so that the text of the risk assessment can concentrate on those constituents that most significantly contribute to the risk. Those components of the risk that do not significantly contribute to the risk will not be given equal weight in the body of the report. Thus, the risk will be calculated using the list of analytes remaining after eliminating the components which were not detected in any sample or, in the case of the inorganics in soil , not significantly different than background. However, the text and the summary risk tables will highlight only those components which contribute to the majority of the risk. The guidance for this approach is described in Section 5.9 of RAGS.

The screening of the database into two groups, one which will be summarized in the text and the other which will not, was performed in three steps. The first screening step considered the following factors:

1. An analyte was detected in less than 5% of the samples for a given media.
2. The analyte was not detected in only other media.
3. There was no historical evidence that the analyte was used at the site.
4. The maximum detected value was below the ARAR's.

The analytes that met criteria 1 thru 4 are noted as "no" in the "Passed screening" column in Tables 4A-4D. These analytes will not be included in the risk assessment text. The maximum detected value shown on Tables 4A-4D is the larger of either the maximum detected value or one-half the detection limit for an undetected value. In most cases both of these values were either above or both below the ARAR. However, for a number of analytes in soil, the actual detected value was below the ARAR while one-half the detection limit was above the ARAR. In these cases, if the analyte met all the other criteria they will not be included in these criteria in the risk assessment text. The eleven (11) analytes in soil handled in this manner were:

gamma-BHC (Lindane)
Heptachlor
Aldrin
Heptachlor Epoxide
Dieldrin
Endrin
Aroclor - 1254
Aroclor - 1260
2-Nitroaniline
3-Nitroaniline
Pentachlorophenol

In the second screening step, five (5) essential nutrients (calcium, iron, magnesium, potassium, sodium), are being eliminated from all media since and the risk contributed by these nutrients are considered small.

The final screening step performed was a concentration-toxicity "screen". Tables 5A through 5D present a summary by media of the results of this evaluation. The list of analytes shown on Tables 5A-5D do not include the analytes that were previously eliminated. The toxicity-concentration value was determined as the product of the maximum detected concentration and a risk factor. For carcinogens, the risk factor was the slope factor and for non-carcinogens the risk factor was the Reference Dose (RfD). If two slope factors were available the higher of the two was used. For each analyte, the toxicity-concentration value was determined. If this value contributed to less than 1% of the total, then that analyte was considered as a possible candidate for text elimination.
The evaluation criteria used in this step were:

1. An RfD or a carcinogenic slope factor was available .

2. The analyte represented less than 1% of the carcinogenic or non-carcinogenic concentration-toxicity screen total.
3. The analyte does not have a carcinogenic weight of evidence rank of A.

The analytes that met all these criteria are noted as "no" in the "Passed Screening" column on Tables 5A-5D. Those chemicals noted as "yes" on Tables 5A-5D will be discussed in the human health risk assessment text. These chemicals are summarized on Table 6 by media.

In summary, this analysis has systematically reduced the chemicals of potential concern for human health risk assessment database to include only those analytes that are responsible for the majority of the risk. Tables 1A thru 1D lists those analytes that were removed from the database because they were not detected in any sample. Table 2 provides a summary of the statistical analysis performed between the concentration of inorganic analytes detected in on-site soils and those same constituents found in background soil. Table 3A through 3D presents the remaining analytes that will be used to calculate the human health risk assessment. The second phase of this analysis has "screened" the remaining analytes so that only those components that significantly contribute to the risk will be highlighted in the text and summary tables. Unlike the first analysis, the purpose of the second "screen" was not to eliminate any additional analyte from the risk assessment but to focus the text to include those components that are important to discuss because they contribute most significantly to the risk. These analytes are summarized in Table 6.

One final note, ES anticipates that, when slope factors are unavailable, toxicity equivalent factors (TEFs) will be used to estimate carcinogenic slope factors. TEFs have been established for the PAH compounds since only Benzo(a)Pyrene has a slope factor. This will allow a realistic evaluation of these components in the quantitative risk assessment.

ES would like to discuss these and possibly other issues related to the risk assessment once you have had a chance to consider this letter. Our usual phone conference format would be fine. If you have any questions please call me at (617)-859-2492 to discuss this or any other matter.

Sincerely yours,

ENGINEERING-SCIENCE, INC.

James Chaplick

for Michael Duchesneau, P.E.
Project Manager

MD/jmd/D#10

cc: K. Healy - CEHND
R. Battaglia - SEAD
K. Hoddinott - USAEHA
K. Buchi - THAMA
K. Gupta - NYSDEC

TABLE 1A
Seneca Army Depot – OB Grounds RI/FS
Human Health Risk Assessment
List of Chemicals Analyzed for but
Not Detected in Soil Samples

Volatile Organic Compounds	Semivolatiles	Pesticides/PCBs
Chloromethane	bis(2–Chloroethyl) ether	alpha–BHC
Bromomethane	2–Chlorophenol	Methoxychlor
Vinyl Chloride	1,3–Dichlorobenzene	Endrin ketone
Chloroethane	1,4–Dichlorobenzene	gamma–Chlordane
Carbon Disulfide	Benzyl Alcohol	Toxaphene
1,1–Dichloroethene	1,2–Dichlorobenzene	Aroclor–1016
1,1–Dichloroethane	2,2'–oxybis(1–Chloropropane)	Aroclor–1221
1,2–Dichloroethane	N–Nitroso–di–n–propylamine	Aroclor–1232
Vinyl Acetate	Hexachloroethane	Aroclor–1242
Bromodichloromethane	Nitrobenzene	Aroclor–1248
1,2–Dichloropropane	Isophorone	
cis–1,3–Dichloropropene	2–Nitrophenol	Explosives
Dibromochloromethane	bis(2–Chloroethoxy) methane	
1,1,2–Trichloroethene	2,4–Dichlorophenol	None
trans–1,3–Dichloropropene	1,2,4–Trichlorobenzene	
Bromoform	4–Chloroaniline	Metals
4–Methyl–2–Pentanone	Hexachlorobutadiene	
2–Hexanone	4–Chloro–3–methylphenol	None
1,1,2,2–Tetrachloroethane	Hexachlorocyclopentadiene	
Ethylbenzene	2,4,6–Trichlorophenol	
Styrene	2,4,5–Trichlorophenol	
	Dimethylphthalate	
	2,4–Dinitrophenol	
	4–Nitrophenol	
	4–Chlorophenyl–phenylether	
	4–Nitroaniline	
	4,6–Dinitro–2–methylphenol	
	4–Bromophenyl–phenylether	
	3,3'–Dichlorobenzidine	

TABLE 1B
Seneca Army Depot – OB Grounds RI/FS
Human Health Risk Assessment
List of Chemicals Analyzed for but
Not Detected in Sediment Samples

Volatile Organic Compounds	Semivolatiles	Pesticides/PCBs
Chloromethane	Phenol	alpha–BHC
Bromomethane	bis(2–Chloroethyl) ether	beta–BHC
Vinyl Chloride	2–Chlorophenol	delta–BHC
Chloroethane	1,3–Dichlorobenzene	gamma–BHC (Lindane)
Methylene Chloride	1,4–Dichlorobenzene	Heptachlor
1,1–Dichloroethene	Benzyl Alcohol	Aldrin
1,1–Dichloroethane	1,2–Dichlorobenzene	Heptachlor epoxide
1,2–Dichloroethene (total)	2–Methylphenol	Endosulfan I
1,2–Dichloroethane	2,2'–oxybis(1–Chloropropane)	Dieldrin
2–Butanone	N–Nitroso–di–n–propylamine	Endrin
1,1,1–Trichloroethane	Hexachloroethane	Endosulfan II
Carbon Tetrachloride	Nitrobenzene	4,4'–DDD
Vinyl Acetate	Isophorone	Endosulfan sulfate
Bromodichloromethane	2–Nitrophenol	Methoxychlor
1,2–Dichloropropane	2,4–Dimethylphenol	Endrin ketone
cis–1,3–Dichloropropene	Benzoic acid	Endrin aldehyde
Dibromochloromethane	bis(2–Chloroethoxy) methane	alpha–Chlordane
1,1,2–Trichloroethene	2,4–Dichlorophenol	gamma–Chlordane
Benzene	1,2,4–Trichlorobenzene	Toxaphene
trans–1,3–Dichloropropene	4–Chloroaniline	Aroclor–1016
Bromoform	Hexachlorobutadiene	Aroclor–1221
4–Methyl–2–Pentanone	4–Chloro–3–methylphenol	Aroclor–1232
2–Hexanone	Hexachlorocyclopentadiene	Aroclor–1242
Tetrachloroethene	2,4,6–Trichlorophenol	Aroclor–1248
1,1,2,2–Tetrachloroethane	2,4,5–Trichlorophenol	Aroclor–1254
Toluene	2–Chloronaphthalene	Aroclor–1260
Chlorobenzene	2–Nitroaniline	
Ethylbenzene	Dimethylphthalate	Explosives
Styrene	Acenaphthylene	
Xylene (total)	3–Nitroaniline	1,3,5–Trinitrobenzene
	Acenaphthene	1,3–Dinitrobenzene
	2,4–Dinitrophenol	Tetryl
	4–Nitrophenol	2,6–Dinitrotoluene
	Dibenzofuran	
	Diethylphthalate	Metals
	4–Chlorophenyl–phenylether	
	Fluorene	Thallium
	4–Nitroaniline	
	4,6–Dinitro–2–methylphenol	
	4–Bromophenyl–phenylether	
	Hexachlorobenzene	
	Pentachlorophenol	
	Butylbenzylphthalate	
	3,3'–Dichlorobenzidine	
	Di–n–octylphthalate	
	Dibenz(a,h)anthracene	
	Benzo(g,h,i)perylene	

TABLE 1C
Seneca Army Depot – OB Grounds RI/FS
Human Health Risk Assessment
List of Chemicals Analyzed for but
Not Detected in Groundwater Samples

Volatile Organic Compounds	Semivolatiles	Pesticides/PCBs
Chloromethane	Phenol	alpha–BHC
Bromomethane	bis(2–Chloroethyl) ether	beta–BHC
Vinyl Chloride	2–Chlorophenol	delta–BHC
Chloroethane	1,3–Dichlorobenzene	gamma–BHC (Lindane)
Methylene Chloride	1,4–Dichlorobenzene	Heptachlor
Carbon Disulfide	Benzyl Alcohol	Aldrin
1,1–Dichloroethene	1,2–Dichlorobenzene	Heptachlor epoxide
1,1–Dichloroethane	2–Methylphenol	Endosulfan I
trans–1,2–Dichloroethene	2,2'–oxybis(1–Chloropropane)	Dieldrin
cis–1,2–Dichloroethene	4–Methylphenol	4,4'–DDE
1,2–Dichloroethene (total)	N–Nitroso–di–n–propylamine	Endrin
Chloroform	Hexachloroethane	Endosulfan II
1,2–Dichloroethane	Nitrobenzene	4,4'–DDD
2–Butanone	Isophorone	Endosulfan sulfate
1,1,1–Trichloroethane	2–Nitrophenol	4,4'–DDT
Carbon Tetrachloride	2,4–Dimethylphenol	Methoxychlor
Vinyl Acetate	Benzoic acid	Endrin ketone
Bromodichloromethane	bis(2–Chloroethoxy) methane	Endrin aldehyde
1,2–Dichloropropane	2,4–Dichlorophenol	alpha–Chlordane
cis–1,3–Dichloropropene	1,2,4–Trichlorobenzene	gamma–Chlordane
Trichloroethene	Naphthalene	Toxaphene
Dibromochloromethane	4–Chloroaniline	Aroclor–1016
1,1,2–Trichloroethane	Hexachlorobutadiene	Aroclor–1221
Benzene	4–Chloro–3–methylphenol	Aroclor–1232
trans–1,3–Dichloropropene	2–Methylnaphthalene	Aroclor–1242
Bromoform	Hexachlorocyclopentadiene	Aroclor–1248
4–Methyl–2–Pentanone	2,4,6–Trichlorophenol	Aroclor–1254
2–Hexanone	2,4,5–Trichlorophenol	Aroclor–1260
Tetrachloroethene	2–Chloronaphthalene	
1,1,2,2–Tetrachloroethane	2–Nitroaniline	Explosives
Toluene	Dimethylphthalate	
Chlorobenzene	Acenaphthylene	HMX
Ethylbenzene	2,6–Dinitrotoluene	1,3,5–Trinitrobenzene
Styrene	3–Nitroaniline	1,3–Dinitrobenzene
Xylene (total)	Acenaphthene	Tetryl
Dichlorodifluoromethane	2,4–Dinitrophenol	4–amino–2,6–Dinitrotoluene
Trichlorofluoromethane	4–Nitrophenol	2–amino–4,6–Dinitrotoluene
2,2–Dichloropropane	Dibenzofuran	2,4–Dinitrotoluene
Bromochloromethane	2,4–Dinitrotoluene	
1,1–Dichloropropene	4–Chlorophenyl–phenylether	Metals
Dibromomethane	Fluorene	
1,3–Dichloropropane	4–Nitroaniline	Thallium
1,2–Dibromoethane	4,6–Dinitro–2–methylphenol	
1,1,1,2–Tetrachloroethane	N–Nitrosodiphenylamine	
Isopropylbenzene	4–Bromophenyl–phenylether	
Bromobenzene	Hexachlorobenzene	
1,2,3–Trichloropropane	Pentachlorophenol	
n–Propylbenzene	Phenanthrene	
2–Chlorotoluene	Anthracene	
4–Chlorotoluene	Carbazole	
1,3,5–Trimethylbenzene	Fluoranthene	
tert–Butylbenzene	Pyrene	
1,2,4–Trimethylbenzene	Butylbenzylphthalate	
sec–Butylbenzene	3,3'–Dichlorobenzidine	
1,3–Dichlorobenzene	Benzo(a)anthracene	
1,4–Dichlorobenzene	Chrysene	
p–Isopropyltoluene	bis(2–Ethylhexyl)phthalate	
1,2–Dichlorobenzene	Benzo(b)fluoranthene	
n–Butylbenzene	Benzo(k)fluoranthene	
1,2–Dibromo–3–Chloropropane	Benzo(a)pyrene	
1,2,4–Trichlorobenzene	Indeno(1,2,3–cd)pyrene	
Hexachlorobutadiene	Dibenz(a,h)anthracene	
Naphthalene	Benzo(g,h,i)perylene	
1,2,3–Trichlorobenzene		

TABLE 1D
Seneca Army Depot – OB Grounds RI/FS
Human Health Risk Assessment
List of Chemicals Analyzed for but
Not Detected in Surface Water Samples

Volatile Organic Compounds	Semivolatiles	Pesticides/PCBs
Chloromethane	Phenol	alpha–BHC
Bromomethane	bis(2–Chloroethyl) ether	beta–BHC
Vinyl Chloride	2–Chlorophenol	delta–BHC
Chloroethane	1,3–Dichlorobenzene	gamma–BHC (Lindane)
1,1–Dichloroethene	1,4–Dichlorobenzene	Heptachlor
1,1–Dichloroethane	Benzyl Alcohol	Aldrin
1,2–Dichloroethene (total)	1,2–Dichlorobenzene	Heptachlor epoxide
Chloroform	2–Methylphenol	Endosulfan I
2–Butanone	2,2'–oxybis(1–Chloropropane)	Dieldrin
1,1,1–Trichloroethane	4–Methylphenol	4,4'–DDE
Carbon Tetrachloride	N–Nitroso–di–n–propylamine	Endrin
Vinyl Acetate	Hexachloroethane	Endosulfan II
Bromodichloromethane	Nitrobenzene	4,4'–DDD
1,2–Dichloropropane	Isophorone	Endosulfan sulfate
cis–1,3–Dichloropropene	2–Nitrophenol	4,4'–DDT
Dibromochloromethane	2,4–Dimethylphenol	Methoxychlor
1,1,2–Trichloroethene	Benzoic acid	Endrin ketone
Benzene	bis(2–Chloroethoxy) methane	Endrin aldehyde
trans–1,3–Dichloropropene	2,4–Dichlorophenol	alpha–Chlordane
Bromoform	1,2,4–Trichlorobenzene	gamma–Chlordane
4–Methyl–2–Pentanone	Naphthalene	Toxaphene
2–Hexanone	4–Chloroaniline	Aroclor–1016
Tetrachloroethene	Hexachlorobutadiene	Aroclor–1221
1,1,2,2–Tetrachloroethane	4–Chloro–3–methylphenol	Aroclor–1232
Toluene	2–Methylnaphthalene	Aroclor–1242
Chlorobenzene	Hexachlorocyclopentadiene	Aroclor–1248
Ethylbenzene	2,4,6–Trichlorophenol	Aroclor–1254
Styrene	2,4,5–Trichlorophenol	Aroclor–1260
Xylene (total)	2–Chloronaphthalene	
	2–Nitroaniline	Explosives
	Dimethylphthalate	
	Acenaphthylene	HMX
	2,6–Dinitrotoluene	1,3,5–Trinitrobenzene
	3–Nitroaniline	1,3–Dinitrobenzene
	Acenaphthene	2,4,6–Trinitrotoluene
	2,4–Dinitrophenol	4–amino–2,6– Dinitrotoluene
	4–Nitrophenol	2–amino–4,6– Dinitrotoluene
	Dibenzofuran	2,6–Dinitrotoluene
	2,4–Dinitrotoluene	2,4–Dinitrotoluene
	Diethylphthalate	
	4–Chlorophenyl–phenylether	Metals
	Fluorene	
	4–Nitroaniline	Antimony
	4,6–Dinitro–2–methylphenol	Cadmium
	N–Nitrosodiphenylamine (1)	Cobalt
	4–Bromophenyl–phenylether	Silver
	Hexachlorobenzene	Thallium
	Pentachlorophenol	
	Phenanthrene	
	Anthracene	
	Carbazole	
	Di–n–butylphthalate	
	Fluoranthene	
	Pyrene	
	Butylbenzylphthalate	
	3,3'–Dichlorobenzidine	
	Benzo(a)anthracene	
	Chrysene	
	Di–n–octylphthalate	
	Benzo(b)fluoranthene	
	Benzo(k)fluoranthene	
	Benzo(a)pyrene	
	Indeno(1,2,3–cd)pyrene	
	Dibenz(a,h)anthracene	
	Benzo(g,h,i)perylene	

TABLE 2

SENECA ARMY DEPOT OB GROUNDS RI/FS
HUMAN HEALTH RISK ASSESSMENT
STATISTICAL COMPARISON OF METALS IN SOILS TO BACKGROUND

	POPULATION (EXCLUDING BACKGROUND)			BACKGROUND				ELIMINATED IN RISK
	N(m)	X(m)	S(m)	N(b)	X(b)	S(b)		
METALS	COUNT	AVERAGE	STD. DEV.	COUNT	AVERAGE	STD. DEV.	T	ASSESSMENT (a)
Aluminum	250.00	16462.65	4164.17	15	15796.00	3771.19	0.66	yes
Antimony	178.00	0.64	0.28	15	0.65	0.11	−0.27	yes
Arsenic	237.00	5.60	2.89	15	5.08	1.87	1.01	yes
Barium	227.00	2.48	0.65	15	1.91	0.17	9.32	no
Beryllium	140.00	0.74	0.18	15	0.89	0.23	−2.44	yes
Cadmium	250.00	0.09	0.67	15	−0.18	0.57	1.75	yes
Calcium	249.00	4.08	0.48	15	4.08	0.67	−0.01	yes
Chromium	234.00	1.43	0.19	15	1.37	0.12	1.89	yes
Cobalt	250.00	12.62	3.73	15	13.75	3.36	−1.25	yes
Copper	239.00	2.06	0.71	15	1.33	0.09	14.04	no
Iron	250.00	29693.98	7852.12	15	29886.67	6209.77	−0.11	yes
Lead	237.00	2.25	0.91	15	1.06	0.16	16.55	no
Magnesium	250.00	6923.29	3152.04	15	7555.33	3348.83	−0.71	yes
Manganese	250.00	585.79	241.43	15	855.40	464.80	−2.23	yes
Mercury	188.00	−1.14	0.42	14	−1.29	0.28	1.85	yes
Nickel	250.00	38.59	11.95	15	36.63	10.35	0.71	yes
Potassium	250.00	1695.35	597.82	15	1371.67	348.81	3.31	no
Selenium	240.00	−0.59	0.40	15	−0.81	0.34	2.33	yes
Silver	229.00	−0.40	0.37	15	−0.43	0.31	0.32	yes
Sodium	233.00	1.92	0.38	15	1.76	0.20	2.87	no
Thallium	250.00	−0.57	0.21	15	−0.62	0.08	2.03	yes
Vanadium	246.00	24.71	5.51	15	23.17	5.12	1.13	yes
Zinc	250.00	2.38	0.58	15	1.89	0.10	10.78	no
Cyanide	248.00	0.36	0.22	15	0.33	0.04	1.78	yes

Note: a) A t-Test Statistic of 2.59 which represents a confidence level of 99% was used as the criteria to eliminate the chemical from the Risk Assessment.
b) Log transformed data was used when required to normalize data.

Table 3A (Page 1 of 3)
Seneca Army Depot - OB Grounds RI/FS
Human Health Risk Assessment Database Summary
List of Chemicals in Soils Included in Risk Assessment

Analyte	Max. Conc. *ug/Kg(1)*	RfD *mg/kg/day*	Rank *Wt. of Evidence*	Carc. Slope	
				Oral	*Inh*
Volatile Organics					
Methylene Chloride	60	0.06	B2	7.5E-03	4.7E-03
Acetone	230	0.1	D	NA(2)	NA
Dichloroethene, 1,2- (total)	60	NA	-	NA	NA
Chloroform	60	0.01	B2	6.1E-03	2.3E-05
Butanone, 2-	60	0.6	D	NA	NA
Carbon Tetrachloride	60	0.0007	B2	1.3E-01	1.5E-05
Trichloroethane, 1,1,1-	60	NA	D	NA	NA
Trichloroethene	100	NA	-	NA	NA
Benzene	60	NA	A	2.9E-02	8.3E-06
Tetrachloroethene	110	0.01	-	NA	NA
Toluene	60	0.2	D	NA	NA
Chlorobenzene	60	0.02	D	NA	NA
Xylene (total)	60	2	D	NA	NA
Semi-volatiles					
Phenol	3,600	0.6	D	NA	NA
Methylphenol, 2-	3,600	0.05	C	NA	NA
Methylphenol, 4-	3,600	NA	C	NA	NA
Dimethylphenol, 2,4-	3,600	0.02	-	NA	NA
Benzoic acid	14,000	4	D	NA	NA
Naphthalene	3,600	NA	D	NA	NA
Methylnaphthalene, 2-	4,700	NA	-	NA	NA
Chloronaphthalene, 2-	3,600	0.08	-	NA	NA
Nitoaniline, 2-	14,000	NA	-	NA	NA
Acenaphthylene	3,600	NA	-	NA	NA
Dinitrotoluene, 2,6-	3,600	NA	-	NA	NA
Nitroaniline, 3-	14,000	NA	-	NA	NA
Acenaphthene	3,600	NA	-	NA	NA
Dibenzofuran	3,600	NA	-	NA	NA
Dinitrotoluene, 2,4-	33,000	0.002	-	NA	NA
Diethylphthalate	3,600	NA	-	NA	NA
Fluorene	3,600	0.04	D	NA	NA
N-Nitrosodiphenylamine	7,000	NA	B2	4.9E-03	NA
Hexachlorobenzene	3,600	0.00034	-	NA	NA
Pentachlorophenol	14,000	0.03	B2	1.2E-01	NA
Phenanthrene	3,600	NA	-	NA	NA
Anthracene	3,600	0.3	D	NA	NA
Carbazole	3,600	NA	-	NA	NA
Di-n-butylphthalate	5,800	0.1	D	NA	NA

REFERENCES: *Integrated Risk Information Software (IRIS) Online June 22-25, 1993.*

Table 3A (Page 2 of 3)
Seneca Army Depot - OB Grounds RI/FS
Human Health Risk Assessment Database Summary
List of Chemicals in Soils Included in Risk Assessment

Analyte	Max. Conc. *ug/Kg(l)*	RfD *mg/kg/day*	Rank *Wt. of Evidence*	Carc. Slope	
				Oral	*Inh*
Semi-volatiles (cont'd)					
Fluoranthene	4400	0.04	D	NA	NA
Pyrene	5600	NA	-	NA	NA
Butylbenzylphthalate	3600	NA	-	NA	NA
Benzo(a)anthracene	3900	NA	B2	NA	NA
Chrysene	8900	NA	-	NA	NA
bis(2-Ethylhexyl)phthalate	16000	0.02	B2	1.4E-02	NA
Di-n-octylphthalate	3600	NA	-	NA	NA
Benzo(b)fluoranthene	11000	NA	B2	NA	NA
Benzo(k)fluoranthene	4500	NA	B2	NA	NA
Benzo(a)pyrene	3700	NA	B2	7.3E+00	NA
Indeno(1,2,3-cd)pyrene	3600	NA	B2	NA	NA
Dibenz(a,h)anthracene	3600	NA	B2	NA	NA
Benzo(g,h,i)perylene	3600	NA	-	NA	NA
Pesticides/PCB's					
beta-BHC	190	NA	C	1.8E+00	5.3E-04
delta-BHC	190	NA	D	NA	NA
gamma-BHC(Lindane)	190	0.0003	-	NA	NA
Heptachlor	190	0.0005	B2	4.5E+00	1.3E-03
Aldrin	190	0.00003	B2	1.7E+01	4.9E-03
Heptachlor epoxide	190	0.000013	B2	9.1E+00	2.6E-03
Endosulfan I	190	NA	-	NA	NA
Dieldrin	380	0.00005	B2	1.6E+01	4.6E-03
DDE, 4,4'-	830	NA	-	NA	NA
Endrin	380	NA	-	NA	NA
Endosulfan II	480	NA	-	NA	NA
DDD, 4,4'-	380	NA	B2	2.4E-01	NA
Endosulfan sulfate	380	NA	-	NA	NA
DDT, 4,4'-	2800	0.0005	B2	3.4E-01	9.7E-05
Endrin aldehyde	48	NA	-	NA	NA
alpha-Chlordane	1900	NA	-	NA	NA
Aroclor-1254	3800	NA	-	NA	NA
Aroclor-1260	3800	NA	-	NA	NA
Explosives					
HMX	1300	0.05	D	NA	NA
RDX	4800	0.003	C	1.1E-01	NA
Trinitrobenzene, 1,3,5-	7800	0.00005	-	NA	NA
Dinitrobenzene, 1,3-	440	NA	-	NA	NA

REFERENCES: *Integrated Risk Information Software (IRIS) Online June 22-25, 1993.*

Table 3A (Page 3 of 3)
Seneca Army Depot - OB Grounds RI/FS
Human Health Risk Assessment Database Summary
List of Chemicals in Soils Included in Risk Assessment

Analyte	Max. Conc. *ug/Kg(l)*	RfD *mg/kg/day*	Rank *Wt. of Evidence*	Carc. Slope	
				Oral	*Inh*
Explosives (cont'd)					
Tetryl	1000	NA	-	NA	NA
Trinitrotoluene, 2,4,6-	80000	0.0005	C	3.0E-02	NA
Dinitrotoluene, 2,6-, 4-amino-	8900	NA	-	NA	NA
Dinitrotoluene, 4,6-, 2-amino-	11000	NA	-	NA	NA
Dinitrotoluene, 2,6-	380	NA	-	NA	NA
Dinitrotoluene, 2,4-	5100	0.002	-	NA	NA
Metals					
Barium	34400	0.07	-	NA	NA
Calcium	195000	NA	-	NA	NA
Chromium	1430	1	-	NA	NA
Copper	38100	NA	D	NA	NA
Lead	56700	NA	B2	NA	NA
Potassium	3570	NA	-	NA	NA
Sodium	1900	NA	-	NA	NA
Zinc	127000	0.3	D	NA	NA
Cyanide	2.6	0.02	D	NA	NA

REFERENCES: *Integrated Risk Information Software (IRIS) Online June 22-25, 1993.*

Notes: 1. The value shown represents the higher of either the actual measured value or one-half the detection limit.
2. NA - Not Available

Table 3B (Page 1 of 2)

Seneca Army Depot - OB Grounds RI/FS
Human Health Risk Assessment Database Summary
List of Chemicals in Sediment Included in Risk Assessment

Analyte	Max. Conc. *ug/Kg(1)*	RfD *mg/kg/day*	Rank	Carc. Slope	
				Oral	*Inh*
Volatile Organics					
Acetone	34	0.1	D	NA(2)	NA
Chloroform	20	0.01	B2	6.1E-03	2.3E-05
Carbon Disulfide	14	0.1	-	NA	NA
Trichloroethene	18	NA	-	NA	NA
Semi-volatiles					
Methylphenol, 4-	3100	NA	C	NA	NA
Naphthalene	3100	NA	D	NA	NA
Methylnaphthalene, 2-	3100	NA	-	NA	NA
Dinitrotoluene, 2,6-	3100	NA	-	NA	NA
Dinitrotoluene, 2,4-	3100	0.002	-	NA	NA
N-Nitrosodiphenylamine	3100	---	B2	4.9E-03	---
Phenanthrene	3100	NA	-	NA	NA
Anthracene	3100	0.3	D	NA	NA
Carbazole	540	NA	-	NA	NA
Di-n-butylphthalate	3100	0.1	D	NA	NA
Fluoranthene	3100	0.04	D	NA	NA
Pyrene	3100	NA	-	NA	NA
Benzo(a)anthracene	3100	NA	B2	NA	NA
Chrysene	3100	NA	-	NA	NA
bis(2-Ethylhexyl)phthalate	3100	0.02	B2	1.4E-02	NA
Benzo(b)fluoranthene	3100	NA	B2	NA	NA
Benzo(k)fluoranthene	3100	NA	B2	NA	NA
Benzo(a)pyrene	3100	NA	B2	7.3E+00	NA
Indeno(1,2,3-cd)pyrene	3100	NA	B2	NA	NA
		NA	-	NA	NA
Pesticides/PCB's		NA	-	NA	NA
		NA	-	NA	NA
DDE, 4,4'-	130	NA	-	NA	NA
DDT, 4,4'-	130	0.0005	B2	3.4E-01	9.7E-05
		NA	-	NA	NA
Explosives		NA	-	NA	NA
		NA	-	NA	NA
HMX	1000	0.05	D	NA	NA
RDX	500	0.003	C	1.1E-01	NA
Trinitrotoluene, 2,4,6-	120	0.0005	C	3.0E-02	NA
Dinitrotoluene, 2,6-, 4-amino-	160	NA	-	NA	NA
Dinitrotoluene, 4,6-, 2-amino-	180	NA	-	NA	NA
Dinitrotoluene, 2,4-	120	0.002	-	NA	NA

REFERENCES: Integrated Risk Information Software (IRIS) Online June 22-25, 1993.

Table 3B (Page 2 of 2)
Seneca Army Depot - OB Grounds RI/FS
Human Health Risk Assessment Database Summary
List of Chemicals Detected in Sediment

Analyte	Max. Conc. *ug/Kg*	RfD *mg/kg/day*	Rank	Carc. Slope	
				Oral	*Inh*
Metals					
Aluminum	25800	NA	-	NA	NA
Antimony	28.3	NA	-	NA	NA
Arsenic	9.5	0.0003	A	NA	4.3E-03
Barium	1780	0.07	-	NA	NA
Beryllium	1.6	0.005	B2	4.3E-03	2.4E-03
Cadmium	9.7	0.0005	B1	NA	1.8E-03
Calcium	104000	NA	-	NA	NA
Chromium	41.8	1	-	NA	NA
Cobalt	17.7	NA	-	NA	NA
Copper	3790	NA	D	NA	NA
Iron	40900	NA	-	NA	NA
Lead	7400	NA	B2	NA	NA
Magnesium	12000	NA	-	NA	NA
Manganese	1520	0.005	D	NA	NA
Mercury	2	NA	-	NA	NA
Nickel	64.4	NA	-	NA	NA
Potassium	3530	NA	-	NA	NA
Selenium	3	NA	-	NA	NA
Silver	3.4	0.005	-	NA	NA
Sodium	285	NA	-	NA	NA
Vanadium	37.9	NA	-	NA	NA
Zinc	1200	0.3	D	NA	NA
Cyanide	2	0.02	D	NA	NA

REFERENCES: Integrated Risk Information Software (IRIS) Online June 22-25, 1993.

Notes: 1. The value shown represents the higher of either the actual measured value or one-half the detection limit.
2. NA - Not Available

Table 3C

Seneca Army Depot - OB Grounds RI/FS
Human Health Risk Assessment Database Summary
List of Chemicals in Surface Water Included in Risk Assessment

Analyte	Max. Conc. *ug/L(1)*	RfD *mg/kg/day*	RANK	Carc. Slope	
				Oral	*Inh*
Volatile Organics					
Methylene Chloride	10	0.06	B2	7.5E-03	4.7E-03
Acetone	35	0.1	D	—	—
Dichloroethane, 1,2-	10	NA(2)	-	NA	NA
Carbon Disulfide	10	0.1	-	NA	NA
Trichloroethene	17	NA	D	NA	NA
Semi-volatiles					
bis(2-Ethylhexyl)phthalate	71	0.02	B2	1.4E-02	NA
Explosives					
RDX	9.4	0.003	C	1.1E-01	NA
Tetryl	7800	0.00005	-	NA	NA
Metals					
Aluminum	5220	NA	-	NA	NA
Arsenic	4.4	0.0003	A	NA	4.3E-03
Barium	523	0.07	-	NA	NA
Beryllium	3.5	0.005	B2	4.3E-03	2.4E-03
Calcium	183000	NA	-	NA	NA
Chromium	9.6	1	-	NA	NA
Copper	59.8	NA	D	NA	NA
Iron	8550	NA	-	NA	NA
Lead	74.2	NA	B2	NA	NA
Magnesium	59900	NA	-	NA	NA
Manganese	1080	0.005	D	NA	NA
Mercury	0.17	NA	-	NA	NA
Nickel	35.2	NA	-	NA	NA
Potassium	6050	NA	-	NA	NA
Selenium	3.2	NA	-	NA	NA
Sodium	59100	NA	-	NA	NA
Vanadium	39.2	NA	-	NA	NA
Zinc	13.6	0.3	D	NA	NA
Cyanide	14.9	0.02	D	NA	NA

REFERENCES: *Integrated Risk Information Software (IRIS) Online June 22-25, 1993.*

Notes: 1. The value shown represents the higher of either the actual measured value or one-half the detection limit.
2. NA - Not Available

Table 3D

Seneca Army Depot - OB Grounds RI/FS
Human Health Risk Assessment Database Summary
List of Chemicals in Groundwater Included in Risk Assessment

Analyte	Max. Conc. *ug/L(1)*	RfD *mg/kg/day*	Rank *Weight of Evidence*	Carc. Slope	
				Oral	*Inh*
Volatile Organics					
Acetone	15	0.1	D	NA(2)	NA
Semi-volatiles					
Diethylphthalate	11	NA	-	NA	NA
Di-n-butylphthalate	11	0.1	D	NA	NA
Di-n-octylphthalate	11	NA	-	NA	NA
Explosives					
RDX	0.6	0.003	C	1.1E-01	NA
Trinitrotoluene, 2,4,6-	0.21	0.0005	C	3.0E-02	NA
Dinitrotoluene, 2,6-	0.12	NA	-	NA	NA
Metals					
Aluminum	243000	NA	-	NA	NA
Antimony	65.7	NA	-	NA	NA
Arsenic	15.8	0.0003	A	NA	4.3E-03
Barium	2230	0.07	-	NA	NA
Beryllium	2.4	0.005	B2	4.3E-03	2.4E-03
Cadmium	51.9	0.0005	B1	NA	1.8E-03
Calcium	1780000	NA	-	NA	NA
Chromium	408	1	-	NA	NA
Cobalt	208	NA	-	NA	NA
Copper	525	NA	D	NA	NA
Iron	469000	NA	-	NA	NA
Lead	275	NA	B2	NA	NA
Magnesium	227000	NA	-	NA	NA
Manganese	6980	0.005	D	NA	NA
Mercury	0.15	NA	-	NA	NA
Nickel	642	NA	-	NA	NA
Potassium	25400	NA	-	NA	NA
Selenium	10	NA	-	NA	NA
Silver	9.1	0.005	-	NA	NA
Sodium	134000	NA	-	NA	NA
Vanadium	324	NA	-	NA	NA
Zinc	3260	0.3	D	NA	NA
Cyanide	32.5	0.02	D	NA	NA

REFERENCES: *Integrated Risk Information Software (IRIS) Online June 22-25, 1993.*

Notes: 1. The value shown represents the higher of either the actual measured value or one-half the detection limit.
2. NA - Not Available

TABLE 4A
Seneca Army Depot - OB Grounds RI/FS Human Health Risk Assessment
Chemicals Detected in Less than 5% of the Soils Samples

Compound	Number of Samples	Number of Detections	Frequency of Detection	Maximum Value Detected (ug/Kg)	ARAR (ppb) (a)	Historic Use	Detected In Other Media (b)	Passed Screening
Volatile Organic Compounds				(c)				
Methylene Chloride	275	7	2.5%	60(21)	100	no	SW	yes
Acetone	272	3	1.1%	230	200	no	GW,SW,SD	yes
1,2-Dichloroethene (total)	275	1	0.4%	60(1)	300	no	none	no
2-Butanone	275	4	1.5%	60(22)	300	no	none	no
1,1,1-Trichloroethane	275	1	0.4%	60(2)	800	no	none	no
Carbon Tetrachloride	275	2	0.7%	60(4)	600	no	none	no
Trichloroethene	275	8	2.9%	100	700	no	SW,SD	yes
Benzene	275	4	1.5%	60(3)	60	no	none	yes
Chlorobenzene	275	1	0.4%	60(4)	1,700	no	none	no
Xylene (total)	275	3	1.1%	60(11)	1,200	no	none	no
Semivolatiles								
Phenol	238	2	0.8%	3600(360)	30	no	none	yes
2-Methylphenol	238	2	0.8%	3600(760)	100	no	none	yes
4-Methylphenol	241	2	0.8%	3600(1300)	900	no	SD	yes
2,4-Dimethylphenol	238	2	0.8%	3600(630)	-	no	none	no
Benzoic acid	112	2	1.8%	14,000(98)	-	no	none	no
2-Chloronaphthalene	240	2	0.8%	3600(130)	-	no	none	no
2-Nitroaniline	248	1	0.4%	14,000(120)	430	no	none	no
Acenaphthylene	240	3	1.3%	3600(540)	41,000	no	none	no
3-Nitroaniline	248	1	0.4%	14,000(350)	500	no	none	no
Acenaphthene	242	8	3.3%	3600(480)	50,000	no	none	no
Dibenzofuran	241	4	1.7%	3600(140)	6,200	no	none	no
Fluorene	243	7	2.9%	3600(710)	50,000	no	none	no
Hexachlorobenzene	242	5	2.1%	3600(90)	410	yes	none	yes
Pentachlorophenol	248	2	0.8%	14,000(140)	1,000	no	none	no
Anthracene	243	9	3.7%	3600(700)	50,000	no	SD	yes
Carbazole	133	5	3.8%	3600(1200)	-	no	SD	yes
Butylbenzylphthalate	241	4	1.7%	3600(140)	50,000	no	none	no
Di-n-octylphthalate	240	4	1.7%	3600(410)	50,000	no	GW	yes
Indeno(1,2,3-cd)pyrene	247	10	4.0%	3600(2300)	3,200	no	SD	yes
Dibenz(a,h)anthracene	241	4	1.7%	3600(670)	14	no	none	yes
Pesticides/PCBs								
beta-BHC	247	1	0.4%	190(2)	200	no	none	no
delta-BHC	247	4	1.6%	190(15)	300	no	none	no
gamma-BHC (Lindane)	247	1	0.4%	190(10)	60	no	none	no
Heptachlor	247	1	0.4%	190(32)	100	no	none	no
Aldrin	247	9	3.6%	190(4)	41	no	none	no
Heptachlor epoxide	247	1	0.4%	190(1)	20	no	none	no
Endosulfan I	247	6	2.4%	190(4)	900	no	none	no
Dieldrin	249	1	0.4%	380(6)	44	no	none	no
Endrin	249	5	2.0%	380(41)	100	no	none	no
Endosulfan II	251	6	2.4%	480	900	no	none	no
4,4'-DDD	247	10	4.0%	380(4)	2,900	no	none	no
Endosulfan sulfate	247	5	2.0%	380(11)	1,000	no	none	no
Endrin aldehyde	137	1	0.7%	48(5)	-	no	none	no
alpha-Chlordane	248	7	2.8%	1900(270)	-	no	none	no
Aroclor-1254	247	1	0.4%	3800(430)	1,000	no	none	no
Aroclor-1260	247	2	0.8%	3800(240)	1,000	no	none	no
Explosives								
HMX	248	6	2.4%	1,300	-	yes	SD	yes
1,3-Dinitrobenzene	248	9	3.6%	440	-	yes	none	yes
Tetryl	249	8	3.2%	1,000	-	yes	SW	yes
2,6-Dinitrotoluene	245	1	0.4%	380(67)	-	yes	GW	yes

Notes: a) ARAR = New York recommended soil cleanup objectives from Appendix A, Table 1 from TAGM dated Nov. 16, 1992
b) SW = Surface water, SD = Sediment, GW = Groundwater
c) One Half detection limit with maximum value actually detected in parantheses.

TABLE 4B
Seneca Army Depot - OB Grounds RI/FS Human Health Risk Assessment
Chemicals Detected in Less than 5% of the Sediment Samples

Compound	Number of Samples	Number of Detections	Frequency of Detection	Maximum Value Detected (ug/Kg)	ARAR (a)	Historic Use	Detected In Other Media (b)	Passed Screening
Volatile Organic Compounds								
Trichloroethene	32	1	3.1%	(c) 18	-	no	SW, S	yes
Semivolatiles								
2-Methylnaphthalene	27	1	3.7%	3100(12)	-	no	S	yes
2,6-Dinitrotoluene	27	1	3.7%	3100(120)	-	yes	GW,S	yes
N-Nitrosodiphenylamine (1)	27	1	3.7%	3100(120)	-	yes	S	yes
Anthracene	27	1	3.7%	3100(77)	-	no	S	yes
Benzo(a)anthracene	27	1	3.7%	3100(48)	-	no	S	yes
Benzo(b)fluoranthene	27	1	3.7%	3100(52)	-	no	S	yes
benzo(k)fluoranthene	27	1	3.7%	3100(54)	-	no	S	yes
Benzo(a)pyrene	27	1	3.7%	3100(38)	-	no	S	yes
Indeno(1,2,3-cd)pyrene	27	1	3.7%	3100(37)	-	no	S	yes
Explosives								
RDX	31	1	3.2%	500	-	yes	GW,SW,S	yes
2,4,6-Trinitrotoluene	31	1	3.2%	120(100)	-	yes	GW,S	yes
4-amino-2,6-Dinitrotoluene	31	1	3.2%	160	-	yes	S	yes

Notes: a) No ARARs for sediment.
b) SW = Surface water, GW = Groundwater, S = Soils
c) One Half detection limit with maximum value actually detected in parantheses.

TABLE 4C
Seneca Army Depot - OB Grounds RI/FS Human Health Risk Assessment
Chemicals Detected in Less than 5% of the Surface Water Samples

Compound	Number of Samples	Number of Detections	Frequency of Detection	Maximum Value Detected (ug/L)	ARAR (ppb)(a)	Historic Use	Detected In Other Media (a)	Passed Screening
Volatile Organic Compounds				(d)				
Methylene Chloride	30	1	3.3%	10(8)	4.7(a)	no	S	yes
Carbon Disulfide	30	1	3.3%	10(3)	-	no	SD	yes
1,2-Dichloroethane	30	1	3.3%	10(2)	.38(a)	no	none	yes
Trichloroethene	30	1	3.3%	17	2.7(a)	no	S,SD	yes
Semivolatiles								
bis(2-Ethylhexyl)phthalate	31	1	3.2%	71	0.6(c)	no	S,SD	yes
Explosives								
Tetryl	31	1	3.2%	7800(0.52)	-	yes	S	yes
Metals								
Chromium	30	1	3.3%	906(8.6)	(a)	no	GW,S,SD	yes
Nickel	30	1	3.3%	35.2(5.6)	7.1	no	GW,S,SD	yes

Notes: a) ARAR = The most stringent limit in the New York and Federal ambient water quality criteria.
b) SD = Sediment, GW = Groundwater, S = Soil
c) ARAR = Nov. 15, 1991 New York guidance value.
d) One Half detection limit with maximum value actually detected in parantheses.

TABLE 4D
Seneca Army Depot - OB Grounds RI/FS Human Health Risk Assessment
Chemicals Detected in Less than 5% of the Groundwater Samples

Compound	Number of Samples	Number of Detections	Frequency of Detection	Maximum Value Detected (ug/L)	ARAR (ppb)	Historic Use	Detected In Other Media (b)	Passed Screening
Volatile Organic Compounds								
Acetone	67	2	3.0%	15 (e)	-	no	SW,S,SD	yes
Semivolatiles								
Diethylphthalate	65	1	1.5%	11(1)	50(d)	no	S	yes
Di-n-octylphthalate	65	1	1.5%	11(0.9)	50(d)	no	S	yes
Explosives								
RDX	65	2	3.1%	0.6	2(c)	yes	SW,S,SD	yes
2,4,6-Trinitrotoluene	65	1	1.5%	0.21	2(c)	yes	S,SD	yes
2,6-Dinitrotoluene	65	1	1.5%	0.12(0.087)	.07(d)	yes	S	yes
Metals								
Silver	81	1	1.2%	9.1(5.7)	50(a)	no	S,SD	yes
Cyanide	65	2	3.1%	32.5	100(a)	no	SW,S,SD	yes

Notes: a) ARAR = The most stringent limits in New York Drinking Water Quality Criteria or Federal limit MCLs.
b) SW= Surface Water, S = Soil, SD= Sediment
c) ARAR = April 1992 USEPA Health Advisory, the most stringent value listed.
d) ARAR = Nov. 15, 1991 New York guidance value.
e) One Half detection limit with maximum value actually detected in parantheses.

Table 5A (page 1 of 2)
Seneca Army Depot – OB Grounds RI/FS
Human Health Risk Assessment
Concentration–Toxicity Screening of Soils Data

Analyte	Max. Conc. ug/Kg	RfD mg/kg/day	Rank Wt. of Evidence	Carc. Slope Oral	Carc. Slope Inh	Conc.–Tox Value (Non-Carc.)	Conc.–Tox Value (Carcinogenic)	Conc.–Tox % (Non-Carc.)	Conc.–Tox % (Carcinogenic)	Passed Screening
Volatile Organics										
Methylene Chloride	60	0.06	B2	7.5E–03	4.7E–03	1.0E+03	4.5E–01	0.000282	0.001445	no
Acetone	230	0.1	D	NA	NA	2.3E+03		0.000648		no
Chloroform	60	0.01	B2	6.1E–03	2.3E–05	6.0E+03	3.7E–01	0.001691	0.001175	no
Trichloroethene	100	NA	–	NA	NA					yes
Benzene	60	NA	A	2.9E–02	8.3E–06		1.7E+00		0.005586	yes
Tetrachloroethene	110	0.01	–	NA	NA	1.1E+04		0.0031		no
Toluene	60	0.2	D	NA	NA	3.0E+02		0.000085		no
Total Voc's						**2.1E+04**	**2.6E+00**			
Semi–volatiles										
Phenol	3,600	0.6	D	NA	NA	6.0E+03		0.001691		no
Methylphenol, 2–	3,600	0.05	C	NA	NA	7.2E+04		0.02029		no
Methylphenol, 4–	3,600	NA	C	NA	NA					yes
Naphthalene	3,600	NA	D	NA	NA					yes
Methylnaphthalene, 2–	4,700	NA	–	NA	NA					yes
Dinitrotoluene, 2,6–	3,600	NA	–	NA	NA					yes
Dinitrotoluene, 2,4–	33,000	0.002	–	NA	NA	1.7E+07		4.6		yes
Diethylphthalate	3,600	NA	–	NA	NA					yes
Hexachlorobenzene	3,600	0.00034	–	NA	NA	1.1E+07		3.0		yes
N–Nitrosodiphenylamine	7,000	NA	B2	4.9E–03	NA		3.4E+01		0.110109	no
Phenanthrene	3,600	NA	–	NA	NA					yes
Anthracene	3,600	0.3	D	NA	NA	1.2E+04		0.003382		no
Carbazole	3,600	NA	–	NA	NA					yes
Di–n–butylphthalate	5,800	0.1	D	NA	NA	5.8E+04		0.016345		no
Fluoranthene	4400	0.04	D	NA	NA	1.1E+05		0.030998		no
Pyrene	5600	NA	–	NA	NA					yes
Benzo(a)anthracene	3900	NA	B2	NA	NA					yes
Chrysene	8900	NA	–	NA	NA					yes
bis(2–Ethylhexyl)phthalate	16000	0.02	B2	1.4E–02	NA	8.0E+05	2.2E+02	0.225443	0.719081	no
Di–n–octylphthalate	3600	NA	–	NA	NA					yes
Benzo(b)fluoranthene	11000	NA	B2	NA	NA					yes
Benzo(k)fluoranthene	4500	NA	B2	NA	NA					yes
Benzo(a)pyrene	3700	NA	B2	7.3E+00	NA		2.7E+04		86.7	yes
Indeno(1,2,3–cd)pyrene	3600	NA	B2	NA	NA					yes
Dibenz(a,h)anthracene	3600	NA	B2	NA	NA					yes
Benzo(g,h,i)perylene	3600									yes
Total Semi–Voa's						**2.8E+07**	**2.7E+04**			

(a) ARAR = New York recommended soil cleanup objectives from Appendix A, Table 1 from TAGM dated Nov. 16, 1992.

REFERENCES: *Integrated Risk Information Software (IRIS) Online June 22–25, 1993.*

Table 5A (page 2 of 2)
Seneca Army Depot – OB Grounds RI/FS
Human Health Risk Assessment
Concentration–Toxicity Screening of Soils Data

Analyte	Max. Conc. *ug/L*	RfD *mg/kg/day*	Rank *Wt. of Evidence*	Carc. Slope *Oral*	Carc. Slope *Inh*	Conc.–Tox Value *(Non–Carc.)*	Conc.–Tox Value *(Carcinogenic)*	Conc.–Tox % *(Non–Carc.)*	Conc.–Tox % *(Carcinogenic)*	Passed Screening
Pesticides/PCB's										
DDE, 4,4'–	830	NA	–	NA	NA					yes
DDT, 4,4'–	2800	0.0005	B2	3.4E–01	9.7E–05	5.6E+06	9.5E+02	1.6	3.1	yes
Total Pesticides						5.6E+06	9.5E+02			
Explosives										
HMX	1300	0.05	D	NA	NA	2.6E+04		0.007327		no
RDX	4800	0.003	C	1.1E–01	NA	1.6E+06	5.3E+02	0.450885	1.7	yes
Trinitrobenzene, 1,3,5–	7800	0.00005	–	NA	NA	1.6E+08		44.0		yes
Dinitrobenzene, 1,3–	440	NA	–	NA	NA					yes
Tetryl	1000	NA	–	NA	NA					yes
Trinitrotoluene, 2,4,6–	80000	0.0005	C	3.0E–02	NA	1.6E+08	2.4E+03	45.1	7.7	yes
Dinitrotoluene, 2,6–, 4–amino–	8900	NA	–	NA	NA					yes
Dinitrotoluene, 4,6–, 2–amino–	11000	NA	–	NA	NA					yes
Dinitrotoluene, 2,6–	380	NA	–	NA	NA					yes
Dinitrotoluene, 2,4–	5100	0.002	–	NA	NA	2.6E+06		0.718598		no
Total Explosives						3.2E+08	2.9E+03			
Metals										
Barium	34400	0.07	–	NA	NA	4.9E+05		0.138486		no
Copper	38100	NA	D	NA	NA					yes
Lead	56700	NA	B2	NA	NA					yes
Zinc	127000	0.3	D	NA	NA	4.2E+05		0.119297		no
Total Metals						9.1E+05	0.0E+00			
Total Compounds						3.5E+08	3.1E+04			

(a) ARAR = New York recommended soil cleanup objectives from Appendix A, Table 1 from TAGM dated Nov. 16, 1992.

REFERENCES: *Integrated Risk Information Software (IRIS) Online June 22–25, 1993.*

Table 5B (page 1 of 2)

Seneca Army Depot – OB Grounds RI/FS

Human Health Risk Assessment

Concentration–Toxicity Screening of Sediment Data

Analyte	Max. Conc. ug/kg	RfD mg/kg/day	Rank	Carc. Slope Oral	Carc. Slope Inh	Conc.–Tox Value (Non–Carc.)	Conc.–Tox Value (Carcinogenic)	Conc.–Tox % (Non–Carc.)	Conc.–Tox % (Carcinogenic)	Passed Screening
Volatile Organics										
Acetone	34	0.1	D	NA	NA	3.4E+02		0.0114919		no
Chloroform	20	0.01	B2	6.1E–03	2.3E–05	2.0E+03	1.2E–01	0.0675992	0.0005353	no
Carbon Disulfide	14	0.1	–	NA	NA	1.4E+02		0.0047319		no
Trichloroethene	18	NA	–	NA	NA					yes
Total Voc's						**2.5E+03**	**1.2E–01**			
Semi–volatiles										
Methylphenol, 4–	3100	NA	C	NA	NA					yes
Naphthalene	3100	NA	D	NA	NA					yes
Methylnaphthalene, 2–	3100	NA	–	NA	NA					yes
Dinitrotoluene, 2,6–	3100	NA	–	NA	NA					yes
Dinitrotoluene, 2,4–	3100	0.002	–	NA	NA	1.6E+06		52.4		yes
N–Nitrosodiphenylamine	3100	NA	B2	4.9E–03	NA		1.5E+01		0.0666476	no
Anthracene	3100	0.3	D	NA	NA	1.0E+04		0.3492623		no
Phenanthrene	3100	NA	–	NA	NA					yes
Carbazole	540	NA	–	NA	NA					yes
Di–n–butylphthalate	3100	0.1	D	NA	NA	3.1E+04		1.0		yes
Fluoranthene	3100	0.04	D	NA	NA	7.8E+04		2.6		yes
Pyrene	3100	NA	–	NA	NA					yes
Benzo(a)anthracene	3100	NA	B2	NA	NA					yes
Chrysene	3100	NA	–	NA	NA					yes
bis(2–Ethylhexyl)phthalate	3100	0.02	B2	1.4E–02	NA	1.6E+05	4.3E+01	5.2	0.1904217	yes
Benzo(b)fluoranthene	3100	NA	B2	NA	NA					yes
Benzo(k)fluoranthene	3100	NA	B2	NA	NA					yes
Benzo(a)pyrene	3100	NA	B2	7.3E+00	NA		2.3E+04		99.3	yes
Indeno(1,2,3–cd)pyrene	3100	NA	B2	NA	NA					yes
Total Semi–Voa's						**1.8E+06**	**2.3E+04**			
Pesticides/PCB's										
DDE, 4,4'–	130	NA	–	NA	NA					yes
DDT, 4,4'–	130	0.0005	B2	3.4E–01	9.7E–05	2.6E+05	4.4E+01	8.8	0.1939318	yes
Total Pesticides						**2.6E+05**	**4.4E+01**			
Explosives										
HMX	1000	0.05	D	NA	NA	2.0E+04		0.6759915		no
RDX	500	0.003	C	1.1E–01	NA	1.7E+05	5.5E+01	5.6	0.2413178	yes
Trinitrotoluene, 2,4,6–	120	0.0005	C	3.0E–02	NA	2.4E+05	3.6E+00	8.1	0.0157953	yes
Dinitrotoluene, 2,6–, 4–amino–	160	NA	–	NA	NA					yes
Dinitrotoluene, 4,6–, 2–amino–	180	NA	–	NA	NA					yes
Dinitrotoluene, 2,4–	120	0.002	–	NA	NA	6.0E+04		2.0		yes
Total Explosives						**4.9E+05**	**5.9E+01**			

(a): There are no ARARs for sediments

REFERENCES: Integrated Risk Information Software (IRIS) Online June 22–23, 1993.

Table 5B (page 2 of 2)

Seneca Army Depot – OB Grounds RI/FS

Human Health Risk Assessment

Concentration–Toxicity Screening of Sediment Data

Analyte	Max. Conc. *ug/kg*	RfD *mg/kg/day*	Rank	Carc. Slope		Conc.–Tox Value *(Non-Carc.)*	Conc.–Tox Value *(Carcinogenic)*	Conc.–Tox % *(Non-Carc.)*	Conc.–Tox % *(Carcinogenic)*	Passed Screening
				Oral	*Inh*					
Metals										
Aluminum	25800	NA	–	NA	NA					yes
Antimony	28.3	NA	–	NA	NA					yes
Arsenic	9.5	0.0003	A	NA	4.3E–03	3.2E+04		1.1		yes
Barium	1780	0.07	–	NA	NA	2.5E+04		0.8594749		no
Beryllium	1.6	0.005	B2	4.3E–03	2.4E–03	3.2E+02	6.9E–03	0.0108159	0.0000302	no
Cadmium	9.7	0.0005	B1	NA	1.8E–03	1.9E+04		0.6557118		no
Chromium	41.8	1	–	NA	NA	4.2E+01		0.0014128		no
Cobalt	17.7	NA	–	NA	NA					yes
Copper	3790	NA	D	NA	NA					yes
Lead	7400	NA	B2	NA	NA					yes
Manganese	1520	0.005	D	NA	NA	3.0E+05		10.3		yes
Mercury	2	NA	–	NA	NA					yes
Nickel	64.4	NA	–	NA	NA					yes
Selenium	3	NA	–	NA	NA					yes
Silver	3.4	0.005	–	NA	NA	6.8E+02		0.0229837		no
Vanadium	37.9	NA	–	NA	NA					yes
Zinc	1200	0.3	D	NA	NA	4.0E+03		0.1351983		no
Cyanide	2	0.02	D	NA	NA	1.0E+02		0.00338		no
Total Metals						3.9E+05	6.9E–03			
Total Compounds						3.0E+06	2.3E+04			

(a): There are no ARARs for sediments

REFERENCES: Integrated Risk Information Software (IRIS) Online June 22 – 25, 1993.

Table 5C

Seneca Army Depot – OB Grounds RI/FS
Human Health Risk Assessment
Concentration–Toxicity Screening of Surface Water Data

Analyte	Max. Conc. ug/L	RfD mg/kg/day	Rank	Carc. Slope Oral	Carc. Slope Ink	Conc.–Tox Value (Non-Carc.)	Conc.–Tox Value (Carcinogenic)	Conc.–Tox % (Non-Carc.)	Conc.–Tox % (Carcinogenic)	Passed Screening
Volatile Organics										
Methylene Chloride	10	0.06	B2	7.5E–03	4.7E–03	1.7E+02	7.5E–02	0.000107	3.5	yes
Acetone	35	0.1	D	NA	NA	3.5E+02		0.000224		no
Dichloroethane, 1,2–	10	NA	–	NA	NA					yes
Carbon Disulfide	10	0.1	–	NA	NA	1.0E+02		0.000064		no
Trichloroethene	17	NA	D	NA	NA					yes
Total Voc's						**6.2E+02**	**7.5E–02**			
Semi–volatiles										
bis(2–Ethylhexyl)phthalate	71	0.02	B2	1.4E–02	NA	3.6E+03	9.9E–01	0.002272	46.9	yes
Total Semi–Voa's						**3.6E+03**	**9.9E–01**			
Explosives										
RDX	9.4	0.003	C	1.1E–01	NA	3.1E+03	1.0E+00	0.002005	48.8	yes
Tetryl	7800	0.00005	–	NA	NA	1.6E+08		99.8		yes
Total Explosives						**1.6E+08**	**1.0E+00**			
Metals										
Aluminum	5220	NA	–	NA	NA					yes
Arsenic	4.4	0.0003	A	NA	4.3E–03	1.5E+04		0.009387		yes
Barium	523	0.07	–	NA	NA	7.5E+03		0.004782		no
Beryllium	3.5	0.005	B2	4.3E–03	2.4E–03	7.0E+02	1.5E–02	0.000448	0.710559	no
Chromium	9.6	1	–	NA	NA	9.6E+00		6.1E–06		no
Copper	59.8	NA	D	NA	NA					yes
Lead	74.2	NA	B2	NA	NA					yes
Manganese	1080	0.005	D	NA	NA	2.2E+05		0.138243		no
Mercury	0.17	NA	–	NA	NA					yes
Nickel	35.2	NA	–	NA	NA					yes
Selenium	3.2	NA	–	NA	NA					yes
Vanadium	39.2	NA	–	NA	NA					yes
Zinc	13.6	0.3	D	NA	NA	4.5E+01		0.000029		no
Cyanide	14.9	0.02	D	NA	NA	7.5E+02		0.000477		no
Total Metals						**2.4E+05**	**1.5E–02**			
Total Compounds						**1.6E+08**	**2.1E+00**			

(a) ARARs = the most stringent value in New York State and Federal ambient water quality criteria

REFERENCES: *Integrated Risk Information Software (IRIS) Online June 22–25, 1993.*

Table 5D

Seneca Army Depot – OB Grounds RI/FS
Human Health Risk Assessment
Concentration–Toxicity Screening of Groundwater Data

Analyte	Max. Conc. *ug/L*	RfD *mg/kg/day*	Rank *Weight of Evidence*	Carc. Slope *Oral*	Carc. Slope *Inh*	Conc.–Tox Value *(Non-Carc.)*	Conc.–Tox Value *(Carcinogenic)*	Conc.–Tox % *(Non-Carc.)*	Conc.–Tox % *(Carcinogenic)*	Passed Screening
Volatile Organics										
Acetone	15	0.1	D	NA	NA	1.5E+02		0.009		no
Total VOC's						**1.5E+02**	**0.0E+00**			
Semi–volatiles										
Diethylphthalate	11	NA	–	NA	NA					yes
Di–n–butylphthalate	11	0.1	D	NA	NA	1.1E+02		0.0069		no
Di–n–octylphthalate	11	NA	–	NA	NA					yes
Total Semi–Vos's						**1.1E+02**	**0.0E+00**			
Explosives										
RDX	0.6	0.003	C	1.1E–01	NA	2.0E+02	6.6E–02	0.012	79.9	yes
Trinitrotoluene, 2,4,6–	0.21	0.0005	C	3.0E–02	NA	4.2E+02	6.3E–03	0.026	7.6	yes
Dinitrotoluene, 2,6–	0.12	NA	–	NA	NA					yes
Total Explosives						**6.2E+02**	**7.2E–02**			
Metals										
Aluminum	243000	NA	–	NA	NA					yes
Antimony	65.7	NA	–	NA	NA					yes
Arsenic	15.8	0.0003	A	NA	4.3E–03	5.3E+04		3.3		yes
Barium	2230	0.07	–	NA	NA	3.2E+04		2.0		yes
Beryllium	2.4	0.005	B2	4.3E–03	2.4E–03	4.8E+02	1.0E–02	0.02999	12.5	yes
Cadmium	51.9	0.0005	B1	NA	1.8E–03	1.0E+05		6.5		yes
Chromium	408	1	–	NA	NA	4.1E+02		0.025		no
Cobalt	208	NA	–	NA	NA					yes
Copper	525	NA	D	NA	NA					yes
Lead	275	NA	B2	NA	NA					yes
Manganese	6980	0.005	D	NA	NA	1.4E+06		87.2		yes
Mercury	0.15	NA	–	NA	NA					yes
Nickel	642	NA	–	NA	NA					yes
Selenium	10	NA	–	NA	NA					yes
Silver	9.1	0.005	–	NA	NA	1.8E+03		0.113721323		no
Vanadium	324	NA	–	NA	NA					yes
Zinc	3260	0.3	D	NA	NA	1.1E+04		0.678995443		no
Cyanide	32.5	0.02	D	NA	NA	1.6E+03		0.102		no
Total Metals						**1.6E+06**	**1.0E–02**			
Total Compounds						**1.6E+06**	**8.3E–02**			

(a) ARARs = the most stringent of the New York DWQSs and Federal MCLs
(b) ARARs = New York Guidance Value

REFERENCES: *Integrated Risk Information Software (IRIS) Online June 22–25, 1993.*

Table 6
Seneca Army Depot – OB Grounds RI/FS
Human Health Risk Assessment
Chemicals to be Included in Summary Risk Assessment

Analyte	SOILS	GROUNDWATER	SURFACE WATER	SEDIMENT
Volatile Organics				
Methylene Chloride			X	
Dichloroethane, 1,2–			X	
Trichloroethene	X		X	X
Benzene	X			
Semi–volatiles				
Methylphenol, 4–	X			X
Naphthalene	X			X
Methylnaphthalene, 2–	X			X
Dinitrotoluene, 2,6–	X			X
Dinitrotoluene, 2,4–	X			X
Diethylphthalate	X	X		
Hexachlorobenzene	X			
Phenanthrene	X			X
Carbazole				X
Di–n–butylphthalate				X
Fluoranthene				X
Pyrene	X			X
Benzo(a)anthracene	X			X
Chrysene	X			X
bis(2–Ethylhexyl)phthalate			X	X
Di–n–octylphthalate	X	X		
Benzo(b)fluoranthene	X			X
Benzo(k)fluoranthene	X			X
Benzo(a)pyrene	X			X
Indeno(1,2,3–cd)pyrene	X			X
Dibenz(a,h)anthracene	X			
Benzo(g,h,i)perylene	X			
Pesticides/PCB's				
DDE, 4,4'–	X			X
DDT, 4,4'–	X			X
Explosives				
HMX	X(1)			X(1)
RDX	X	X	X	X
Trinitrobenzene, 1,3,5–	X			
Dinitrobenzene, 1,3–	X			
Tetryl	X		X	
Trinitrotoluene, 2,4,6–	X	X		X
Dinitrotoluene, 2,6–, 4–amino–	X			X
Dinitrotoluene, 4,6–, 2–amino–	X			X
Dinitrotoluene, 2,6–	X	X		
Dinitrotoluene, 2,4–	X(1)			X
Metals				
Aluminum		X	X	X
Antimony		X		X
Arsenic		X	X	X
Barium	X(1)	X	X(1)	X(1)
Beryllium		X		
Cadmium		X		
Cobalt		X		X
Copper	X	X	X	X
Lead	X	X	X	X
Manganese		X		X
Mercury		X	X	X
Nickel		X	X	X
Selenium		X	X	X
Vanadium		X	X	X
Zinc	X(1)	X(1)	X(1)	X(1)

Notes: 1). Chemicals that did not pass screening but will be included in summary risk assessment due to historical usage.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, NEW YORK 10278-0012

NOV 18 1993

EXPRESS MAIL
RETURN RECEIPT REQUESTED

Mr. Randall Battaglia
FFA Program Manager
Directorate of Engineering & Housing
Seneca Army Depot
Romulus, New York 14541-5001

Re: Draft Remedial Investigation (RI) Report at the Open Burning (OB) Grounds

Dear Mr. Battaglia:

This is in response to the draft RI report at the OB Grounds prepared by Engineering Science, Inc. for the Seneca Army Depot dated October 1993. EPA received this document October 12, 1993.

Outstanding Issues: EPA's Phase II Recommendations and Data Gaps Noted in the PSCROBG

- Additional monitoring wells were installed as part of the Phase II field investigation to help better define ground water flow patterns at the site. Specifically, EPA was concerned that ground water flow direction may not flow entirely west to east, as indicated in the PSCROBG, but may also include radial flow components and include flow to the northeast and southwest. Consequently, ES installed six additional monitoring wells as part of the Phase II field investigation.

  It is noted, however, that ground water elevations from several monitoring wells were not included in the determination of ground water flows patterns at the site. Ground water elevations from monitoring wells MW-1, MW-4, MW-16, MW-17, and MW-41 do not appear to have been included in the analysis of ground water flow patterns at the site based on the information presented on Figure 3-16. No explanation was provided in the text of the RI Report for omitting this data.

This information should be considered because ground water flow patterns are not necessarily flowing in a distinct easterly direction in all areas east of the ground water divide at the site, as is indicated on Figure 3-16. Based on available ground water level data, there appear to be several areas (e.g., Burn Pad H) at the OB site at which ground water flow patterns are not as distinct as has been presented on Figures 3-12 through 3-16 of the RI Report. Although ground water flow patterns determined by ES based on April 1993 data appear to accurately characterize the general directions of ground water flow at the site and that the current monitoring well network, in most cases, is adequate to monitor ground water quality downgradient of potential source areas, it is recommended that ground water flow patterns at the site be reanalyzed and that all available ground water elevation data be utilized to fully define ground water flow patterns at the OB Ground site. Based on an analysis of ground water flow patterns at the site which utilizes all available data, it may be determined that a monitoring well is not located directly downgradient of all potential source areas.

- The RI Report states (p. 6-19, Section 6.2.3) "A compound was determined to be non-detected if its qualifier was a U, UJ, UR, or R." The use of UR and R as "non-detect" data is incorrect. Rejected data indicates that the data quality is so deficient that the data is not usable for both the quantitation and identification of that analyte. If a data point is rejected, it should be considered void and not non-detected. The only way to confirm the presence (or absence) of that analyte is with re-sampling and re-analysis. Consequently, it is important that ES review the existing raw analytical data for the OB Grounds property to verify that all compounds or analytes that have been previously declared as non-detect values are truly non-detect. If specific compounds or analytes have Rs as qualifiers in a significant number of samples, it may be necessary to resample to determine whether these analytes are absent or present in site media. This data gap (i.e., a significant number of rejected data) could severely impact the results of the FS.

Data Quality Review

Appendix G presents a glossary of laboratory data qualifiers but the summary tables only qualify data with a "U", "J", or "R". The data qualifier glossary does not define the qualifier "R". The "R" qualifier usually indicates that the result has been rejected due to data quality problems identified during data validation. The presence of the "R" data qualifier and the lack of laboratory data qualifiers (which are no longer significant following data validation) in the summary tables presented in Appendix G indicates that data have been validated according to Regional data validation guidelines. Section 6.2.2.4 of the report defines the data qualifiers used in the validation of the data.

Technical Review of the RI Report for the Open Burning Grounds

PAGE-SPECIFIC COMMENTS

Regional Hydrogeologic Setting

Comment #5 The comment is partially addressed.

The text explains in more detail solutional cavities in limestone and indicates that "limestone wells" yield up to 150 gallons per minute (gpm). However, the locations of drinking water wells in the area that are screened in the limestone aquifer have not been identified. To avoid confusion, ES should discuss in the RI Report any data that is available which would verify whether or not a hydrologic interconnection exists between ground water beneath the site and these hydrogeologic units.

Section 2.0 - Study Area Investigation

Tables and Figures

Comment #44 The comment is partially addressed.

In the RI Report, Tables 2-7, 2-8, 2-9 have been changed to Tables 2-9, 2-10, and 2-11, respectively. The analytical parameters and results are presented in the tables and an explanation of the sampling criteria is presented in Section 2.5.5. The tables now include footnotes for Levels IV and V analyses; however, the footnotes do not indicate whether all other samples were subject to Level II analyses.

Comment #45 The comment is not addressed.

Table 2-10 has been changed to Table 2-13 in the RI Report. Although Table 2-13 has been revised, information concerning monitoring well MW-19 is contradictory and needs to be addressed. Table 2-13 states the depth of monitoring well MW-19 is 5.28 feet below ground surface (bgs); however, it is further stated that the screened interval is 13.0 to 15.0 feet.

Comment #49 The comment is not addressed.

Figure 2-1 has been changed to Figure 2-9 in the RI Report. However, it has not been revised to include the requested information (graphic depictions of site features).

Section 3.0 - Detailed Site Description

Site Hydrogeology

Comment #59 The comment is not fully addressed.

Ground water elevations in monitoring wells MW-4, MW-5, MW-6, MW-7 and MW-16 are not included in the RI Report. See the evaluation of the response to comment #144 for further discussion of this issue.

Comment #60 The comment is not addressed.

See the evaluation of the response to comment #144 for further discussion.

Comment #71 The comment is addressed.

The RI Report has been revised to state that no impacts to wildlife is expected since few individuals are expected to be on the site due to the limited habitat present. However, it should be noted that this is a current situation. In the future, any changes that may occur at the site (e.g., revegetation of the area and general improvement of habitat) could result in additional wildlife species being attracted to the site and exposure of these individuals to site contaminants would increase. Although not significant at this time, it should be considered in future use scenarios for the site.

Section 4.0 - Nature and Extent of Contamination

Comment #78 The comment is not addressed.

No additional information regarding the quantitation of total VOCs using screening methods has been included in the RI Report.

Comment #100 The comment is not addressed.

A discussion of the pertinence of background samples and background concentrations from other sources/references is important to the analytical results; however, this information has

not yet been provided. Section 6.2.1.2, Background Sampling (Section 6.0 contains the Baseline Risk Assessment), indicates that a discussion of analytical results of background samples is presented in Section 4.0 of the RI Report. However, the data from background samples and discussions regarding inorganic results in relation to background levels presented in Section 4.0 of the RI Report are difficult to follow. A more detailed discussion of background samples and respective analytical results in relation to the distribution of contaminants observed in site media is needed.

Comment #101 The comment is not addressed.

Although stated on p. 2-14, ¶1, the use of sample SW-196 as a reference sample is not reiterated in Section 4.6, where appropriate. A discussion of the pertinence of background samples is important to the analytical results. See evaluation of response to comment #100.

Tables and Figures

General Comments

Comment #112 The comment is not addressed.

The data qualifier J (estimated) has not been added to the results for chrysene in sample PBG-6-1 in Table 4-8.

Comment #115 The comment is addressed.

The RI Report has been revised, as requested. However, the highest concentrations of 2-methylphenol and 4-methylphenol were noted in sample PCB-1-4A, not PCB-1-4, as stated on p. 4-34, ¶4. The text should be edited and a colon (:) inserted following "four" in the second sentence to clarify the statement.

Comment #117 The comment is not addressed.

Data qualifiers have not been revised in paragraph 4 on page 4-57. Also, refer to our general comments regarding data quality.

Comment #123 The comment is not addressed.

The data qualifier and the sample designation do not agree between Table 4-7 and the text on page 4-41, paragraph 4.

Appendix C

Comment #131 The comment is partially addressed.

The presentation of the boring logs is still not of high quality. It is suggested that logs of all wells at the site (if available) be provided in the RI Report.

Appendix E (Appendix F in the PSCROBG)

Comment #132 The comment is not addressed in Appendix E.

It should be stated as to whether construction diagrams are available for MW-5 to MW-7.

Appendix F (Appendix I in the PSCROBG)

Comment #133 The comment is partially addressed in Section 3.

Additional information and references for the specific software and methods used for the analysis of the hydraulic conductivity are still needed.

EPA Water Management Division Comments

Comment #136 The comment is partially addressed in Table 1-6.

The Federal Maximum Contaminant Levels (MCLs) have been revised in Table 1-6 for barium, cadmium, chromium, lead and selenium. However, a note should be made for the value for lead, which is an action level, not an MCL. Silver and fluorine do not have MCLs but do have Secondary Maximum Contaminant Levels (SMCLs), which should also be noted.

Comment #138 The comment is not addressed.

Toxic Compound Leaching Program (TCLP) limits have not been added to Table 1-4.

Comment #141 The comment is not addressed.

Field data sheets have not been included in the appendices.

Recommendations For The Phase II RI

The comment is partially addressed.

This comment provided a summary of outstanding issues from the Phase I RI and made several recommendations for the Phase II RI. Except for one outstanding issue, which dealt with contaminant distribution and migration pathway analysis, these issues are discussed in detail in the comments that follow (see comment #144 through comment #154). The issue regarding contaminant migration and migration pathway analyses is discussed below.

The PSCROBG did not present a conceptual model of the site and, therefore, an evaluation of ES's interpretation of data and site-specific conditions in relation to potential sources of contamination, migration pathways, and exposure routes was not possible. A Contaminant Fate and Transport section (Section 5.0) is presented in the RI Report. The Contaminant Fate and Transport section generally discusses the physical site characterization, chemical characterization of media, contaminant persistence, and contaminant migration via the surface water and air pathways. The most significant issue identified during our review of this section is the failure of the conceptual model for the site to address the ground water migration pathway and to clearly define each of the potential exposure routes via each pathway (i.e., ground water, surface water, and air) for human and environmental receptors. It is recommended that ES revise the conceptual model for the site to address the ground water pathway and clearly identify all potential exposure routes for human and environmental receptors. Additional discussion of these and other issues relating to the Contaminant Fate and Transport section of the RI Report is presented below.

Comment #144 The comment is partially addressed.

ES installed six additional monitoring wells as part of the Phase II field investigation. Two monitoring wells (MW-36 and MW-37) were installed approximately 375 feet west of existing monitoring well MW-10 to allow better definition of ground water flow along the southwestern boundary of the OB Ground site. One monitoring well (MW-38) was install approximately 275 feet north-northwest of existing monitoring well MW-16 and two monitoring wells (MW-39 and MW-40) were installed approximately 475 feet north-northwest of existing monitoring well MW-15 to help better

define ground water flow north of the site. Monitoring well MW-41 was installed approximately 525 feet south of monitoring well cluster MW-25 and MW-26 to better define ground water flow southeast of the site.

It is noted, however, that ground water elevations from several monitoring wells were not included in the determination of ground water flows patterns at the site. Ground water elevations from monitoring wells MW-16, MW-17, and MW-41 were not included on Figure 3-16 and no explanation was provided in the text of the RI Report for omitting this data. The ground water elevation data from monitoring well MW-41 should have been included in the analysis of ground water flow patterns at the site and presented on Figure 3-16 (and, where appropriate, Figures 3-12 through 3-15). The ground water elevation contour lines should have been drawn to incorporate this data so as to provide a better delineation of ground water flow patterns south of the OB Ground property.

Ground water elevations for monitoring wells MW-1 and MW-4 also do not appear to have been included in the analysis of ground water flow at the site. The RI Report states (page 2-45, paragraph 2) that "...MW-1 through MW-4 were located in the OD area and are not relevant to this investigation." This statement is not accurate. Monitoring well MW-1 is located along the northern portion of the OB Ground site, approximately 200 feet northeast of monitoring well MW-31. Monitoring well MW-4 is located approximately 800 feet north of monitoring well MW-21. Inclusion of the ground water elevation data for these wells in the analysis of ground water flow at the site (and on Figure 3-16) would have provided better definition of ground water flow patterns along the northern boundary of the OB Ground site. This information should be considered because ground water flow patterns are not necessarily flowing in a distinct easterly direction in all areas east of the ground water divide at the site, as is indicated on Figure 3-16. For example, the ground water elevation difference between monitoring wells MW-19 and MW-31 is approximately 2.2 feet. Ground water flow may be flowing in a easterly direction, as indicated in Figure 3-16, but it may also be flowing from Burn Pad H (a potential source area) in a northeasterly direction towards MW-1 and offsite. It is recommended that ground water flow patterns at the site be reanalyzed and that all available ground water elevation data be utilized to define ground water flow patterns at the OB Ground site.

As noted above, there appears to be several areas (e.g., Burn Pad H) of the OB site at which ground water flow patterns are not as distinct as has been presented on Figures 3-12 through 3-16 of the RI Report. Therefore, based on an analysis of ground water flow patterns at the site which utilizes all available data, it may be determined that a monitoring well is not located directly downgradient of all potential source areas.

EPA also requested that the RI Report present the methodology that was used to determine the ground water elevation contours on Figures 3-12 through 3-16. This information was not provided in the RI Report.

Comment #150 It is unclear if this comment is addressed.

Analytical results are presented in summary tables in Appendix G. Appendix G presents a glossary of laboratory data qualifiers but the summary tables only qualify data with a "U", "J", and "R". The data qualifier glossary does not define the qualifier "R". The "R" qualifier usually indicates that the result has been rejected due to data quality problems found during the data validation. The presence of the "R" data qualifier and the lack of laboratory data qualifiers, which are no longer significant following data validation, in the summary tables presented in Appendix G indicate that the data has been validated according to Regional data validation guidelines. Section 6.2.2.4 of the report defines the data qualifiers used in the validation of the data.

Comment #152 The comment is partially addressed.

See the response to comment #144 above.

Comment #153 The comment is partially addressed.

The discussion regarding hydraulic conductivities of the till and the weathered shale has been revised and the hydraulic conductivity values have been recalculated. ES has provided documentation in the RI Report to explain the variation of the hydraulic conductivities in the till and weathered shale layers. However, ES does not discuss why the average values for the overburden wells included only those wells completed by ES.

Comments, EPA letter received 22 July 1992

Comment #156 The comment is not addressed.

The RI Report as well as the site plans do not acknowledge the existence of the 100-year flood plain in the vicinity of the SEAD property. This data requirement will need to be addressed during the development of the feasibility study as it may be an applicable or relevant and appropriate requirement (ARAR).

Analysis of New Information

Ecological Assessment (Sections 2.7, 3.9, and 6.6 of the RI Report)

- A terrestrial biotic assessment and a macroinvertebrate sampling program was performed as part of the Phase II field investigation at the OB Ground property. The RI Report states that a clearly defined trend in the mayflies (*Ephemeroptera*), stoneflies (*Plecoptera*), and caddisflies (*Tricoptera*) (also known as EPT) to chironomid ratio was not observed in Reeder Creek. Although the EPT to chironomid ratio could not be located in the RI Report, the lack of a clearly defined trend appears to be true. However, the ratio did decline substantially at Station SW-130. This sampling location is located downgradient of a surface water input from the OB Ground property. The likelihood that the observed decrease in EPT abundance may be attributable to the tributary input should be discussed in the ecological risk assessment.

- The RI report identified copper and lead as the primary ecological contaminants of concern at the OB grounds. This conclusion appears to be supported by the information provided in the Ecological Risk Assessment (ERA). However, concentrations of aluminum within the surface waters of the site (and within the adjacent Reeder Creek) are also of concern and need to be discussed further in the ERA.

- Tables 6-37 through 6-41 of the ERA provide a comparison of the 95th percentile upper confidence limit (UCL) of the contaminant concentration with applicable media guidelines/criteria. It would be very helpful and insightful to provide in addition the mean concentrations of contaminants detected for each medium within these tables. Mean concentrations may be more indicative of exposure for some of the potential receptor species identified.

Contaminant Fate and Transport (Section 5.0 of the RI Report)

The PSCROBG did not present a conceptual model of the site and, therefore, an evaluation of ES's interpretation of data and site-specific conditions in relation to potential sources of contamination, migration pathways, and exposure routes was not possible. A Contaminant Fate and Transport section

(Section 5.0) is presented in the RI Report. The Contaminant Fate and Transport section generally discusses the physical site characterization, chemical characterization of media, contaminant persistence, and contaminant migration via the surface water and air pathways. The most significant issue identified during our review of this section is the failure of the conceptual model for the site to address the ground water migration pathway and to clearly define each of the potential exposure routes via each pathway (i.e., ground water, surface water, and air) for human and environmental receptors. It is recommended that ES revise the conceptual model for the site to address the ground water pathway and clearly identify all potential exposure routes for human and environmental receptors. These and other issues relating to the Contaminant Fate and Transport section of the RI Report are discussed in more detail below.

Page-Specific Issues

Specific issues identified during the review of these newly presented sections are discussed below on a page-specific basis.

Sections 2.7, 3.9, and 6.6 - Ecological Risk Assessment Issues

Page 3-49, ¶3 — The RI report states that a clearly defined trend in the EPT to chironomid ratio was observed in Reeder Creek. Although the EPT to chironomid ratio could not be located in the RI, the lack of a clearly defined trend appears to be generally true. However, the ratio did decline substantially at Station SW-130. This sampling location is located downgradient of a surface water input from the Open Burning Grounds. The likelihood that the observed decrease in EPT abundance may be attributable to the tributary input should be discussed in the ERA.

Page 6-139, ¶2 — The RI states that the U.S. Fish and Wildlife Service (USFWS) approves the deer management plan of the herd present at the Seneca Army Depot. Approval of game species management plans is typically conducted by the state wildlife agency (New York State Division of Fish and Wildlife). It is unclear if the reference to USFWS is incorrect or is a result of special circumstances at the Depot such as the occurrence of the unusual white-pelage deer at the depot. Please clarify.

Page 6-151, ¶2 — The RI states that the deer mouse was selected as a terrestrial receptor species. However, Table 6-36 identifies the white-footed mouse (*Peromyscus leucopus*) as a receptor species. Although the deer mouse (*P. maniculatus*) is closely related to the white-

footed mouse, one or the other species should be retained as the receptor species in order to maintain consistency throughout the RI document.

Page 6-162, ¶2 — The RI states that a total of 13 VOCs and 37 SVOCs were eliminated as chemicals of concern because they were detected at concentrations lower than those reported in the literature to be phytotoxic. This is incorrect as phytotoxicity values were not provided for all 13 VOCs and for 36 of the 37 SVOCs. It is recommended that the scientific literature (e.g. PHYTOTOX database) be reexamined in an attempt to locate plant toxicity concentrations for these contaminants and the pesticide/PCB contaminants detected in surface soils of the site.

Page 6-163 Table 6-38 — Sediment guidelines developed by New York State Department of Environmental Conservation (NYSDEC) (1989) are presented in this table. For organic contaminants, it appears that the organic carbon normalized sediment criteria presented in NYSDEC (1989) were adjusted by applying a total organic carbon (TOC) content of one percent to the criteria. The basis for the one percent TOC value is not provided. It is unclear if this value for TOC represents an actual value that was quantified from the sediment sampling or if it represents an estimate of the TOC. This should be clarified.

Page 6-169 Table 6-40 — NYSDEC Ambient Water Quality Criteria (AWQC) for various metals are presented in this table based on a water hardness value of 400 mg/L $CaCO_3$. It is unclear how this value was derived. The data or rationale for using this value should be provided. In addition, the NYSDEC AWQC presented for bis(2-ethylhexyl)phthalate is incorrect. The correct value is 0.6 micrograms per liter (μg/L). This value should be corrected.

Page 6-172, ¶5 — Potential rare species identified in the RI report as potentially occurring within the vicinity of the site include the osprey and bog turtle. The scientific names of these species are incorrectly spelled. In addition, species (last word of paragraph)is also incorrectly spelled. Please correct these apparent typographical errors.

Page 6-174, ¶1 — The RI report states that risks to aquatic life are not anticipated as the 95th percentile UCL is below federal/state criteria as presented in Table 6-41. The comparison of AWQC and the 95th percentile UCL is presented in Table 6-40. From this table, criteria are exceeded for aluminum, iron, mercury, selenium, and bis(2-

ethylhexyl)phthalate. Therefore, risks to aquatic life should be reassessed in this paragraph.

Page 6-177, ¶3 The RI report states that concentrations of contaminants detected in sediments were compared with proposed sediment guidelines developed by NYSDEC (1989) and Long and Morgan (1991). However, National Oceanic and Atmospheric Administration (NOAA) sediment guidelines (Long and Morgan, 1991) were not presented in the ERA. Please delete this reference.

Page 6-179, ¶3 The RI report states that NYSDEC has not published aquatic life standards for aluminum. However, the NYSDEC surface water quality standard for aluminum that is protective of aquatic propagation is established at 100 ug/L (exceeded by the 95th percentile UCL aluminum concentration in Reeder Creek). This should be clarified.

Page 6-179, ¶3 The RI concludes that surface water concentrations of aluminum and iron (95th percentile of UCL) are below chronic criteria for protecting the identified aquatic receptor species (pumpkinseed and fathead minnow). Therefore, these contaminants present low risk to aquatic biota. It is unclear whether chronic criteria (different from AWQC) were used to assess risk to the two fish receptor species (none were presented in the ERA). This should be clarified.

Page 6-180, ¶2 The RI report concludes that metals (primarily copper and lead) present low to moderate risk based on their low bioavailability and their low 95th percentile UCL. However, copper and lead 95th percentile UCL are substantially elevated above NYSDEC (1989) Limit of Tolerance sediment guidelines which would be detrimental to the majority of benthic species. It is also unclear how the bioavailability of copper and lead were determined. The acid-volatile sulfide (AVS) content of the sediment has been reported in previous studies within the scientific literature to be correlated with the bioavailability of some metals (including copper) but this parameter does not appear to have been assessed. Please clarify how the bioavailability of copper and lead was determined and the subsequent rationale for the low to moderate risk rating for these two metals.

Section 5.0 - Contaminant Fate and Transport

Page 5-10, ¶1 — The measure of the affinity of a compound for the organic fraction of the soil is the organic carbon coefficient, K_{oc}. ES states that "compounds with a K_{oc} greater than 500 milliliters per gram (mL/g) are generally considered immobile". However, as indicated in Table 5-2 of the RI Report and in the reference (Dragun, 1988) used by ES, compounds with a K_{oc} between 500 and 2,000 mL/g are considered to have a low mobility, whereas compounds with a K_{oc} greater than 2,000 mL/g are considered to be immobile. Therefore, ES's statement is not entirely accurate.

Page 5-10, ¶5 — ES indicates that the major migration pathways of concern at the site are surface water runoff, the interaction of surface water with surficial soils, and the air pathway. ES does not indicate that ground water is a migration pathway of concern and does not provide any basis for dismissing ground water as a pathway of concern. Without an evaluation of the ground water migration pathway, the conceptual model for the site is incomplete. Elevated levels of several contaminants, including semi-volatile organic compounds (SVOCs), explosives, and metals, have been detected in ground water at the site. Therefore, ground water quality data indicate that contaminants have migrated to the saturated zone and impacted ground water to some degree. It is recommended that ES give consideration to the ground water pathway in the conceptual model for the site and identify any exposure pathways that may exist for human and environmental receptors (e.g., private drinking water wells, contaminant loadings to Reeder Creek due to any contaminated ground water discharge to the stream and/or surface water runoff).

ES indicates that "a secondary pathway of concern is ingestion of fish from Reeder Creek". It should be noted that this is a potential exposure pathway and not a migration pathway. Discussion of this exposure pathway within the text which identifies potential migration pathways is inappropriate and confusing.

Page 5-12, ¶2 — ES indicates that "organic compounds are usually converted to less hazardous compounds, with carbon dioxide and water being the major end products of aerobic degradation". However, it should also be noted that there are a number of organic compounds (i.e., halogenated organic compounds) for which intermediate degradation products may be more hazardous (e.g., vinyl chloride). Because organic compounds may degrade to

more hazardous constituents, it may be necessary to evaluate the exposure routes and associated risks to potential human and/or environmental receptors based on the more hazardous intermediate compounds that may occur. Although, currently, organic compounds may not be present in site media at concentrations which pose unacceptable risk to human and environmental receptors via potential exposure routes, discussions regarding the biodegradation of organic compounds should not omit discussion regarding the general potential for more hazardous intermediate degradation products to occur.

Page 5-12, ¶3 — ES indicates that a "half-life refers to the time it would take for half of the mass of the organic constituent to degrade". This statement, without, qualification, suggests that the organic compound will degrade to carbon dioxide and water. This is not necessarily correct. A half-life simply refers to the time it takes for half of the mass of a parent compound to degrade to another compound(s) (which could be more hazardous than the parent compound), which may or may not be carbon dioxide and water.

Page 5-13, ¶1 — Another mechanism for bioaccumulation is the ingestion of contaminated surface water and sediments by fauna. The potential exists at the site for surface water runoff to transport contaminants to wetlands and low-lying areas at the site. Therefore, bioaccumulation may occur in wildlife which utilize these areas as a source of water and/or food (e.g., insects, plants, inadvertent ingestion of sediments, etc.).

Page 5-24, ¶3 — It is not clear how the value for the contaminated surface area of the site (12 acres or 40%) was calculated. It is suggested that ES provide calculations to support the use of this value and the calculations used to determine the quantity of soil to be eroded each year by surface water runoff.

Page 5-25, ¶3 — ES does not appear to have considered impacts and/or exposure pathways associated with the accumulation of contaminants in low areas and wetlands at the site. Surface water accumulating in these low areas/wetlands may recharge the aquifer at the site and therefore may be a route of migration at the site that will result in future impacts to ground water at the site. Also, the potential exposure routes for human and environmental receptors associated with contaminants that are present/accumulate in these areas should be identified and discussed in the conceptual model.

Page 5-31, ¶3 ES indicates that air samples were collected to evaluate the potential of contaminant migration due to wind dispersal of smoke and other particulates during open burning activities and that this data could also be used to evaluate the wind erosion pathway. However, as stated in paragraph 3, page 5-6, "burning was only performed during very low wind conditions". Therefore, it is likely that air samples collected during burning operations were collected at times at which low wind conditions existed. Air samples collected at these times would not likely represent worst-case scenarios for wind erosion of soils (i.e., average to high wind conditions) and, therefore, may not be useful for evaluating the wind erosion pathway.

THE GROUND WATER MANAGEMENT SECTION PROVIDED THESE COMMENTS:

1. The following concentrations should be substituted in Table 4-19:

Contaminant	NY MCL (ug/l)*
Diethylphthalate	50
Di-n-octylphthalate	50
Aluminum	50
Antimony	6
Beryllium	4
Chromium	100
Copper	1300
Nickel	100
Cyanide	200

Note:
* 10 NYCRR Part 5, subpart 5-1, 1992.

2. Chemical-specific, location-specific, and action-specific ARARS and to-be-considered (TBCs) information should be included in the document.

3. Seneca Lake is a regional public water supply source and is considered a recipient of groundwater affected by this site. Therefore, WMD suggests a full range (same parameters as for each monitoring well in this investigation) of sampling be performed at the suspected groundwater drainage areas to determine if the quality of Seneca Lake has been adversely effected by site activities.

4. On-site wetlands were delineated in 1992, according to the 1989 delineation manual. Numerous small, isolated emergent wetland areas were identified on and around the open burning grounds (OBG). It is reported that most of these wetlands resulted from soil excavation activities. Dominant plant species are cattails and rushes. The number of wetlands is variously listed as 38 or 32, and the largest wetland is said to be 140,000 square feet (approx 3 acres) or 0.92 acre. These discrepancies should be corrected in the final document and the total acreage of mapped wetlands should be provided.

5. The discussion regarding wetland jurisdiction and regulation on page 6-173 is flawed. The Marine Wetlands Protection Branch (MWPB) presumes that the mapped wetlands are jurisdictional unless a satisfactory contrary argument is made (we have not received field data sheets, which contain details regarding the wetlands). The discussion further implies that site wetland activities would be "...(exempt)...from regulatory permitting and mitigation requirements under Section 404..." (page 6-173). While Army Corps permits are not required on CERCLA sites, compliance with the Section 404 ARAR and Executive Order 11990 requires adherence to the 404(b)(1) guidelines - wetland impacts must first be avoided, then minimized, and then mitigated. The discussion mistakenly suggests that an acre of wetlands may be destroyed without compensation.

6. Sediment sampling revealed some rather elevated metal concentrations in several wetland areas (e.g., #5 and #26). During the screening of Contaminants of Concern, the calculated 95th percentile concentration for each contaminant was compared to various criteria. We suggest that use of maximum values would provide a more conservative, worst-case analysis:

metal	**max conc ppm** (a)	**95th %** (b)	**NYSDEC criteria** (c)	**phytotox** (d)
copper	3790	319	114	70-640
lead	7400	458	250	150-1000
zinc	1200	261	800	300-3000

a) Table 6-5 b) Table 6-38 c) 1989, LOT values d) Table 6-37

While use of the 95th percentile concentrations provides a site-wide view of ecological risk, the figures are much lower than maxima because non-detects are included in the calculations. The calculated values tend to obscure potential "hot spots."

7. Finally, we note that sediment data, with the exception of summary tables, were not provided. Perhaps these data could be included as an appendix in the final document.

THE ENVIRONMENTAL IMPACTS BRANCH REITERATES THE FOLLOWING COMMENTS:

1. Information should be provided concerning what steps are necessary to ensure that remedial actions comply with the requirements of the National Historic Preservation Act (NHPA). As you know, our review of the previous documents identified the NHPA as a potential ARAR for remedial actions. We also indicated that the September 1986 report, "An Archeological Overview and Management Plan for Seneca Army Depot," appears to satisfy the requirements of a Stage IA Cultural Resources Survey. Consequently, RPM Carla Struble's March 26, 1992 letter to the Army recommended that future RI/FS documents for areas potentially impacting cultural resources include an appropriately scaled map showing the proximity of the site(s) to the identified resources, that the Army address potential impacts of the contamination and remedial action(s) upon these resources, and that they include a recommendation concerning the appropriate level of field work (Stage IB Survey) needed to ensure compliance with the NHPA. However, none of this information is presented or discussed in the draft RI. Therefore, we reiterate the points contained in EPA's March 26, 1992 letter.

2. With respect to ensuring compliance with the Endangered Species Act (ESA), we also reiterate our previous recommendation that the Army should initiate informal consultation directly with the U.S. Fish and Wildlife Service to determine whether any endangered species and/or their habitat may be present on or affected by the site. This will ensure that up-to-date information on this issue is available, since 13 years have elapsed since the January 1980 Installation Assessment that is referenced in the RI.

THE FOLLOWING RECOMMENDATIONS WERE PROVIDED BY EPA's PRE-REMEDIAL AND TECHNICAL SUPPORT SECTION:

<u>BASELINE RISK ASSESSMENT</u> (Human Health)

1. pages 1-20, 1-21 and Table 1-4:

   a. it should be mentioned that EP Toxicity has been replaced by TCLP;

   b. I'm not clear on what the EP Toxicity data of 'page 3 of 3' is showing; the EP Tox. procedure is run on a solid/matrix, not a <u>water</u> sample.

2. page 1-39, 2nd ¶: does this brief discussion bear on the risk assessment? That is, is the purpose of the ¶ only to acknowledge the presence of nearby private drinking water wells, or to indicate that samples from these were incorporated

into the risk assessment? The text should be embellished to explain the significance of the noting that these nearby wells exist, and to indicate if data from them was used or not, and why or why not.

3. Tables 2-4/2-5 and 2-9 - 2-12: it's not clear in the document, how much of the soils data was incorporated into the risk assessment. Contaminants concentrations of varying depths/intervals is presented. For example, when evaluating the soil ingestion scenario, EPA (RAGS guidance) suggests the 0-2 foot composite fraction be used. Only a few samples listed over these tables satisfy that data need.

4. section 4:

   a. it's not clear that for the various sets (pads) of soil data, that only those of the appropriate depths (for each respective exposure) were used in the risk assessment. As an example, on Figure 4-7, soils data of 5 different intervals are presented. Only one of these could be used to evaluate a resident incidentally ingesting soil - the 0-2 foot fraction.

   b. Table 4-3: the only data-rejected values are for copper, and curiously they are nearly all those of the 0-2 foot interval. Is there an explanation for this? Perhaps there should be a mention of how this may have impinged (if it did) on the derivation of an exposure point concentration for Cu in the risk assessment.

5. pages 6-14 - 6-25:

   a. it's not clear that for any of the environmental data sets, that the formula provided at the top of page 6-14 is the appropriate one to have been used in determining exposure point concentrations. For example, on page 6-24, 2nd ¶, it is stated that 13 compounds in soil and 13 compounds in ground water were 'non-normally' distributed. If that is so, then log-normality should have been assumed, and the procedure outlined in OSWER directive #9285.7-081 (transforming data and using a different formula than that shown on page 6-14) should have been applied. I don't believe this was done as the formula for lognormally-distributed data is not shown in the document.

   b. page 6-25, 1st ¶: re comment #6a above, the large number of samples noted here ('between 140 and 250') tells me that probably, the soils data of combined depths/intervals were used in the ingestion pathway. Clarification on this point should be provided.

6. page 6-34, 1st ¶: this is awkward; correctly the document states that if a compound is without a toxicity factor, it is retained in the BRA. The document should just expand on this to say, that such compounds are retained in one or more of the following ways: qualitative discussion, uncertainty section, comparison with an agency approved benchmark or methodology (as was the case here with the evaluation of lead using the UBK model).

7. page 6-54, 2nd ¶, last sentence: this is vague and somewhat incorrect; instead of saying little or no volatiles in the ground water, it should say that there was one (1) COC - acetone. Also, what is the level of detail, ordinarily extended to other pathways, that is lacking from the groundwater inhalation pathway?

8. page 6-56, last sentence: this is editorializing, and should be deleted; it is not unreasonable for a leachable plume to migrate one mile or more. Fortunately for the document, the migrating groundwater contamination was considered in the future land use scenario.

9. page 6-68, 6-99, 6-103-104, Tables 6-12 and 6-13, etc:

   Presently, Region II and some others evaluate the dermal contact to **soils** pathway for only three compounds: cadmium, PCB's, and dioxin. As regards this risk assessment, of these three, only cadmium was present. Hence, a more accurate assessment would consider this metal alone, and eliminate all the other COC's found in soil and sediment. The text of the 2nd ¶ of page 6-96 should be modified to additionally explain that only these three compounds are presently evaluated owing to the lack of adequate toxicity information via this uptake route. As a consequence of removing all compounds but Cd from the soil-dermal exposure, it is highly unlikely that Cd will remain the largest contributor to any computed risk estimates. Hence, such statements (e.g., page 6-104, 4th ¶, page 6-120, 2nd ¶) must be edited accordingly.

10. Table 6-14: the exposure assumption of 0.5 liters/hour as the contact rate for ingestion of surface water while swimming, should be **0.05** liters/hour. In the text of the document (page 6-74, 1st ¶), the correct value is mentioned.

11. page 6-75 middle ¶, Tables 6-15, 6-19:

    although RAGS (Volume I) shows a value of 8.4×10^{-4} for the permeability constant of water, EPA's ORD (in its Interim Report 'Dermal Exposure Assessment: Principles and Applications' suggests the figure $\mathbf{5 \times 10^{-4}}$. For the metals evaluated, the ORD report (page 5-49) provides a default value of $\mathbf{10^{-3}}$, in lieu of using the dermal permeability of water. The changes should be made.

12. page 6-125 - Figure 6-4: the application of the UBK model for assessment of lead health effects is somewhat misapplied. The model is intended to be fed **average**, and not site-specific RME concentrations. As is evident from the soil/dust value, RME numbers were used. This exercise should be re-run in accordance with the provisions of the model. [It is noteworthy that with the soil concentration that was used, the corresponding graph shows a decidedly higher blood lead concentration registering. This is consistent with the concentration used being substantially more (i.e., more than double) the 1,000 ppm upper bound of the Agency's soil Pb clean-up policy.]

Miscellany:

1. Acronyms and Abbreviations:

   a. page 2: 'SEAD' is listed instead of the '**SEDA**' used throughout the document;

   b. page 3: 'trichlor**o**ethene is misspelled

2. page 3-1, 1st ¶, last sentence: 'After 1987, munitions **were** destroyed by . . .'

3. page 6-126, 1st ¶: the CDC underwent a name-change (but not an acronym change) almost a year ago. It is now the 'Centers for Disease Control **and Prevention**'.

ECOLOGICAL RISK ASSESSMENT

In general, the approach to putting together an ecological risk assessment is acceptable. Specific comments follow. Those marked with an * are the more significant technical comments.

1. Section 3.9:

   * a. a map (of any sort, but nevertheless to scale) is a requisite for evaluating the benthic invertebrate community/aquatic assessment program results. I didn't find the information I needed concerning the distance between sampling locations, and in general depicting other geographical/ physiographical (e.g., substrate type) nuances of the locations.

   b. Table 3-13: it wasn't clear why station SW150 had three fish sampling modes applied, whereas the other stations had only electroshocking performed. There were several instances of significant differences in catch values between the two techniques (not unexpected); in calculating

the total number of fish caught, there is no rationale given for using the 'S + E' value; one should be provided. Had the electroshock numbers been higher, would the sum of 'S' and 'E' still have been used? It appears that only because there were very small catches (i.e., < 10) by shocking, were these (catches) added to the seine catch numbers.

* An explanation should be provided for the upstream reference location (SW196) having the least fish caught. It underscores comment #1a above, that calls for a refined description of the stations, and in this case, with the substantiation that SW196 meets the criteria of a true reference location. See comment #8 below, for more regarding station SW196.

2. page 3-55, last sentence: the document must provide a substantiation for the claim regarding fish tumors, or else withdraw the claim.

3. page 3-58, 2nd ¶, 2nd sentence: this should be deleted as it concerns human feeding habits, and as such is irrelevant to the ecological risk assessment.

4. page 3-59, 2nd ¶: delete for the same reason given in comment 3 above.

5. * page 3-77, 2nd ¶: the author's acknowledgement here, that site surveys were conducted at less than an optimal time of the year, does not correct for the fact that critical eco-receptor information was never collected. It hampers the efficacy of the assessment, especially with regard to the plant species associated with the site. The 3rd ¶ of page 3-80 should be deleted, for there can be no basis to such statements when the field effort was admittedly less than intensive, as well as being conducted at the wrong time. Other similar statements to be removed are: the last sentence of page 3-81, page 6-129, 1st ¶, 3rd sentence, page 6-143, 2nd ¶, last 3 sentences, page 6-143, 3rd ¶, last two sentences (this one for the lack of a basis in addition to being irrelevant to the eco assessment), page 6-132, 2nd bullet point, and page 6-172, 4th ¶.

6. page 6-130, 2nd ¶: 'macroinvert**e**brate' is misspelled twice.

7. page 6-134, 2nd ¶: delete as this does not relate to the ecological assessment.

8. page 6-136, next-to-last sentence: here again, an explanation is needed to justify SW196 as being a proper reference point; in addition to having the least fish catch numbers (see comment #1b, 2nd ¶), the fish at this station had the most tumors.

9. page 6-138:

   a. 2nd ¶, 1st sentence: delete last five words (as per comment 3 above);

b. 4th ¶: delete as per comment #3.

10. page 6-143, 3rd ¶: delete as per comments #3 and 6.

11. * the risk assessment, beginning with page 6-146, does not follow an anticipated approach of selecting representative receptor species, and applying a food (chain) modeling argument. In deference to page 6-156 1st ¶, last sentence, such an assessment would not have been beyond the scope of the study. Since a comparison of database and literature value contaminants information is set against organisms - by medium, I don't see the need to have honed in on a select receptor list. In other words, simply screening onsite contaminants concentrations against 'mammals' instead of selecting a particular representative member of that group, would have been sufficient.

*** The term '95% UCL' is not defined in the document, and therefore I cannot be sure what onsite concentrations the document is screening. This term affects all site media.** As the document is performing a screening, rather than a food chain-based appraisal, the preferred approach would have been to compare the maximum value of each contaminant against the benchmark for that particular medium/effect. [If there are no exceedances of the benchmark when using the max 'hit', we can assume, for a particular contaminant, that there is no eco risk issue to be concerned with.] Something may have been lost in using this undefined statistic.

* Nowhere is it stated what the soil and sediment depths are that are being screened, and therefore upon what the 95% UCL represents. If the 95% UCL's are of depths other than the classical 0-6 inch interval, or a mixture of the 0-6 inch fraction with shallower and deeper fractions, the comparisons are not valid.

12. page 6-153, last ¶, 2nd sentence: the source for the claim of organics other than herbicides not being a major plant stressor, should be provided

13. page 6-156, 1st ¶, 2nd sentence: 'There are**, however,** toxicological testing . . '

14. page 6-156, 2nd ¶, 2nd sentence: Table 6-38 does not present toxic contaminant concentrations for rabbit or mice, as the text implies it does.

15. page 6-159, last sentence: the words 'absent or' don't appear to belong; the sentence is incomprehensible with their inclusion.

16. page 6-160, 1st sentence: this is not the correct definition of 'sediment'.

17. page 6-166, 1st ¶: ' . . both the rat **and** mallard.'

18. page 6-166, 2nd ¶: an example should be provided where the literature-reported acute soil concentration is adjusted as described.

19. page 6-168, 3rd ¶: it's not clear what the 'first approach' (see 3rd sentence) is that the ¶ is discussing. If it's not in the document, it should be deleted.

20. * Table 6-40: the basis of 'note b', that the surface water standards/criteria are based on a hardness of 400 mg/L $CaCO_3$, should be provided. Although it is true that a number of the metals are hardness-dependent, there should be a reference to the regulatory standards having been adjusted from a different water quality (e.g., 100 ppm CaCO3 for AWQC), as well as a proof that the water quality onsite has 400 ppm $CaCO_3$. Finally, it would help if the table differentiated between those numbers that derive from the USEPA reference and those that derive from the NYSDEC reference.

21. * page 6-172, 2nd ¶: the 2nd sentence is an incorrect summarization of the degree to which the criteria are exceeded by the sediment 95% UCL's (of Table 6-41); the criteria are exceeded by anything but 'small amounts' (witness Cd, Hg, and Zn, for example). NOAA's ER-L and ER-M's should also have been used in Table 6-41 as screening numbers. As per comment #11(¶2), these NOAA numbers should have been compared with the max 'hits'.

22. page 6-173, 4th ¶, last word: 'specie**s**', whether the singular or plural case.

23. * Page 6-174, 2nd ¶: the jurisdictional status of the wetland parcels has to be 'formally determined'.

24. page 6-174: in all of the wetland sediments discussion, the TOC and grain size of the sediment is not provided; the 3rd ¶ of the page is a good example of how the sediment information was only minimally used. The concentrations should have been used to make statements other than the possible influence on cattail survival. Knowing that the plant toxicological database is weak, the discussion should have looked beyond the effect on the plant, and also speculated on the possible ramifications of the cattails serving as a diet item for other wetland fauna. Also, should the contaminants favor stunting of the plant, the ecological consequences of reduced habitat might have been considered.

The Emergency and Remedial Response Division requested review and comments of this draft OB Grounds RI from the Hazardous Waste Facilities Branch of the Air and Waste Management Division, but received no comments.

In accordance with Article 17.7(b) of our Federal Facility Agreement, this letter constitutes formal closure of EPA's comment period for the draft RI report at the OB Grounds dated October 1993. Any additional comments on this document will only be offered as clarification to the issues discussed in this letter.

If you have any questions, call me at (212) 264-4595.

Sincerely yours,

Carla M. Struble, P.E.
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