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100 Summer Street, 8th Floor • Boston, Massachusetts 02110 • (617) 457-7900 • Fax: (617) 457-7979 • www.parsons.com

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Mr. Scott Bradley
U.S. Army Corps of Engineers
Engineering and Support Center, Huntsville
4820 University Square
Huntsville, AL 35816-1822

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SUBJECT: Seneca Army Depot Activity – Status Report - Preliminary Mini Risk Assessment Results Based on Soil Data Collected at SEAD-59/71, Delivery Order 13, DACA87-02-D-0005

Dear Mr. Bradley:

This memorandum presents the preliminary human health mini risk assessment results based on available in-place soil data from the Fill Area West of Building 135 (SEAD-59) and the Alleged Paint Disposal Area (SEAD-71) (hereafter referred to as the sites) and SEAD-59 stockpile data. The purpose of conducting the mini risk assessment was to assess whether or not the soils that currently remain at the sites and the stockpile soils at the sites after the Time Critical Removal Action (TCRA) conducted in 2002, exhibit any risk to current or future users of the sites. The results of the mini risk assessment indicate that the risks for potential receptors under the industrial scenario exceed the USEPA target risk limits when the maximum values of constituents remaining at the sites are used. In addition, carcinogenic Polycyclic Aromatic Hydrocarbon (PAH) concentrations at certain locations within the sites were above the New York State Department of Environmental Conservation (NYSDEC) cleanup goal (i.e., benzo(a)pyrene equivalent concentration of 10 mg/kg). Therefore, a baseline risk assessment is proposed to evaluate potential threats to human health and the environment in the absence of any remedial action and provide the basis for determining whether or not additional remedial action is necessary. Parsons would like to request that Option Task 2 (Baseline Risk Assessment) under contract DACA87-02-D-0005, Delivery Order 13 be made available for the purpose of conducting the baseline risk assessment.

1. Background

SEAD-59/71 is located within the industrial area in the east-central portion of the Seneca Army Depot Activity (SEDA) in Romulus, New York. SEAD-59 was used for the disposal of construction debris and oily sludges. SEAD-71 is designated as the Alleged Paint Disposal Area.

The investigations conducted at SEAD-59 and SEAD-71 included the 1994 Expanded Site Inspection (Parsons, 1995a,b), the 1997 Phase I Remedial Investigation (Parsons, 2002a,b,c), and the 2002 TCRA (ENSR, 2002). The results of the Expanded Site Inspection (ESI) and Remedial Investigation (RI) identified significant releases of benzene, toluene, ethyl benzene, and xylenes (BTEX) and PAH compounds in the materials comprising the fill area and disposal pits at SEAD-59. Both PAHs and heavy metals were detected above their associated NYSDEC criteria levels in surface soils at SEAD-71. In addition, the results of the test pitting investigation confirmed the presence of drums, paint cans, and other containers at SEAD-59/71 (Parsons, 2002a). As a result, the Army prepared an Action Memorandum (Parsons, 2002a) and a Decision Document (Parsons, 2002b) recommending that a Time-Critical Removal Action be conducted to remove the source of potential risks to human health, the environment, and groundwater quality.

The TCRA was conducted at the sites between September and November, 2002 by ENSR Corporation (ENSR, 2002). An estimated 14,105 and 663 in-place cubic yards of soil were excavated at SEAD-59 and SEAD-71, respectively. A total of 7,360 estimated in-place cubic yards of soil were backfilled. Approximately 3,852 tons of excavated soil and debris were shipped off-site for disposal, among which 479 tons of excavated soil were stabilized before they were shipped off-site for disposal. An estimated 5,428 in-place cubic yards of soil were left stockpiled at SEAD-59. After excavation, confirmatory soil samples (grab samples) were collected on the excavation floor and from each wall of the excavation. In addition, all excavated materials were staged in windrows of 500 to 600 cubic yards each and composite soil samples were collected from each windrow. The Final Draft Removal Report (ENSR, 2002) documents this effort and Table 1 in this report summarizes the samples collected during the TCRA and their final disposition (i.e., backfill, stockpile, or off-site disposal).

Groundwater monitoring wells had been installed at the sites during the ESI, Phase I RI, and TCRA and groundwater samples were collected during the ESI and Phase I RI. Groundwater monitoring is an on-going investigation at the sites and exposure to groundwater is not evaluated in this mini risk assessment.

2. Human Health Mini Risk Assessment Introduction

A mini risk assessment was conducted to evaluate potential human health risks associated with exposure to soil at the sites. This section presents a brief summary of the identification of chemicals of potential concern (COPCs), exposure assessment, toxicity assessment, and risk characterization.

2.1 Identification of Chemicals of Potential Concern

2.1.1 Data Used in Mini Risk Assessment

Three data sets were used for the mini risk assessment: (1) in-place SEAD-59 data, (2) in-place SEAD-71 data, and (3) data from the stockpiles that remain at SEAD-59.

For the SEAD-59 and SEAD-71 in-place data sets, soil data collected from all historical site investigations/activities were evaluated to determine whether or not the associated soils are still in-place at the sites. Soil data associated with soil still in-place were included in the risk assessment. Figures 1 and 2 show the locations of all the in-place samples included in the risk assessment for SEAD-59 and SEAD-71, respectively. Tables 1A and 1B summarize the samples included in the risk assessment for SEAD-59 and SEAD-71, respectively. In summary, the following data were included in the in-place data sets for the risk assessment:

- In-place (i.e., not excavated during the TCRA) soil data collected during the 1994 Expanded Site Inspection by Parsons;
- In-place (i.e., not excavated during the TCRA) soil data collected during the 1997 Phase I Remedial Investigation by Parsons;
- Final confirmatory soil data and backfilled windrow soil data collected during the 2002 TCRA; and
- Fill material samples.

Soil data collected during the Expanded Site Inspection and Phase I Remedial Investigation were evaluated to decide whether the associated soil had been excavated during the 2002 TCRA. These samples were designated as in-place or excavated based on the sample information (i.e., ground elevation, sample depth, and sample location), TCRA excavation information provided in the ENSR 2002 Final Draft Removal Report, and professional judgment. For cases where a clear-cut decision could not be made, the samples were assumed to be in-place as a conservative (i.e., human health protective) approach. Only samples designated as in-place were included in the mini risk assessment.
All confirmatory samples collected during the 2002 TCRA activity and listed in Table 1 of the ENSR 2002 Final Draft Removal Report were designated as final (i.e., in-place) and were included in the mini risk assessment, with the exception of the following five samples: CL-59-OTHERC-WE1, CL-71-B-WE1, CL-71-C-WW1, CL-71-D-WW1, and CL-71-D-WW2. These five samples were eliminated from the in-place database based on notations made in the ENSR 2002 Final Draft Removal Report that additional excavation took place at these locations based on elevated levels over NYSDEC Soil Cleanup Criteria presented in the Technical and Administrative Guidance Memorandum 4046 (referred to as TAGM).

All TCRA windrow samples marked as backfilled in Table 1 of the ENSR 2002 Final Draft Removal Report were considered in-place. It should be noted that Sample WS-71-E1-009-3 was designated as stockpile in Table 1 of the ENSR report; however, the 10/31/02 note presented in the report indicated that the referenced windrow was backfilled. Based on the fact that no excavated material was observed stockpiled at SEAD-71 and the 10/31/02 note, Sample WS-71-E1-009-3 was assumed backfilled. The windrow samples designated in-place were included in the mini risk assessment.

Fill material from an off-site borrow pit was sampled to determine if it met TAGM. Fill material samples presented in Table 1 of the ENSR 2002 Final Draft Removal Report were included in the mini risk assessment.

For the SEAD-59 stockpile data set, all windrow samples collected from stockpiles currently located at SEAD-59 were evaluated. Table 1C summarizes the stockpile samples included in the mini risk assessment for the SEAD-59 stockpile data set.

All the data used in the risk assessment have been validated in accordance with the EPA Region II Standard Operating Procedures.

2.1.2 COPC Screening

To streamline the mini risk assessment, a risk screening was conducted to reduce the number of chemicals to be evaluated in the quantitative risk assessment. This approach is consistent with the previous USEPA comments dated August 3, 2001 on the Draft Action Memorandum for Removal Actions at SEAD-59 and SEAD-71. Chemicals of potential concern were identified by screening the maximum detected concentrations (MDCs) for all compounds with detects against the Region III Risk-Based Concentrations that were normalized to a cancer risk of 10^{-6} and a noncancer hazard quotient of 0.1. The Region III Risk-Based Concentrations (RBCs) were used for the screening as they are updated quarterly and generally consistent with the USEPA Risk Assessment Guidance for Superfund. For nutrients such as calcium, magnesium, potassium, and sodium, the recommended dietary reference values (Wright, 2001) were used as the screening values. For lead, the USEPA soil hazard standard for children's play areas, 400 mg/kg (Federal Register, 2001), was used as the screening value. Tables 2A, 2B, and 2C present the screening process for the SEAD-59 in-place, SEAD-71 in-place, and SEAD-59 stockpile data sets, respectively. In general, chemicals with the MDCs greater than 0.1 times of the Region III RBCs, nutrients with the MDCs greater than the recommended dietary references, and lead with the MDC greater than 400 mg/kg were retained as COPCs. Chemicals with no screening values were retained as COPCs unless they were detected at a low frequency (i.e. <10%). As a result, SVOCs (mainly PAHs), Aroclor-1260, pesticides, and metals were identified as chemicals of potential concern for the mini risk assessment. It should be noted that background levels were not used in the COPC screening.

2.1.3 Exposure Point Concentration (EPC)

For the purpose of this mini risk assessment, the maximum detected concentrations for all the soil samples in the respective data sets were used as a conservative estimate of exposure point concentrations for surface soil and subsurface soil. No distinction was made between surface soil and subsurface soil (i.e., all soil was assumed to be accessible). Duplicate samples were treated as discrete samples in deriving the maximum detected concentrations. Tables 3A, 3B, 3C present the exposure point concentrations for the identified COPCs for the SEAD-59 in-place, SEAD-71 in-place, and SEAD-59 stockpile data sets, respectively.

2.2 Exposure Assessment

Currently, the sites are not in use. The Seneca Army Depot is fenced with limited access and patrolled by security personnel. Both SEAD-59 and SEAD-71 are located in the planned industrial development area. Based on the current and future land use at the sites, the following receptors were identified for the mini risk assessment: industrial worker, construction worker, and child at an on-site day care center. This last receptor was included as a conservative receptor and serves as a surrogate in place of a trespasser receptor.

All the receptors were assumed to be exposed to the COPCs via the following exposure pathways: inhalation of dust in ambient air, ingestion of soil, and dermal contact with soil. It should be noted that groundwater exposure was not evaluated in this mini risk assessment. Table 4 presents a summary of exposure assumptions used for this mini risk assessment.

Quantification of exposure (i.e., calculation of average daily dose) was performed following methods recommended in the USEPA Risk Assessment Guidance for Superfund (USEPA, 1989 and updates). The equations and parameters for calculating exposure via inhalation of dust in ambient air and ingestion of soil were presented in Final Decision Document – Mini Risk Assessment, SEAD 9, 27, 28, 32, 33, 34, 43, 44A, 44B, 52, 56, 58, 62, 64A, 64B, 64C, 64D, 66, 68, 69, 70, and 120B (Parsons, 2002d). The evaluation of exposure via dermal contact was consistent with the USEPA Supplemental Guidance for Dermal Risk Assessment (USEPA, 2001a).

2.3 Toxicity Assessment

Human health toxicity values such as reference doses (RfDs) and cancer slope factors were identified in accordance with the recent USEPA guidance. In a memorandum issued to Superfund Regions 1-10 National Policy Managers in December 2003, the USEPA Office of Solid Waste and Emergency

Response (OSWER) provided a revised recommended human health toxicity value hierarchy as follows:

- Tier 1 – EPA's IRIS
- Tier 2 – EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs)
- Tier 3 – Other Toxicity Values.

Table 5 presents the human health toxicity values identified for this mini risk assessment. The toxicity values were identified in accordance with the revised OSWER recommended hierarchy. The toxicity values identified for dermal exposure were consistent with the USEPA Supplemental Guidance for Dermal Risk Assessment (USEPA, 2001a).

2.4 Risk Characterization

2.4.1 Non-carcinogenic Effects

To evaluate non-cancer risks, the ratio of the average daily dose to the reference dose (RfD), or for inhalation exposure pathways, the ratio of the average daily exposure to the reference concentration (RfC), was calculated. This ratio, referred to as a "Hazard Quotient or HQ," indicates whether an exposure to certain COPC is likely to result in adverse health effects. If the calculated value of HQ is less than 1.0, no adverse health effects associated with that COPC are expected. The sum of hazard quotients for all COPCs was calculated as a screening Hazard Index (HI) for a specific exposure route. A cumulative HI for a receptor was calculated by summing the exposure route-specific HI, as a conservative (i.e., human health protective) step.

2.4.2 Carcinogenic Health Risks

Cancer risks are expressed as a unitless probability (*e.g.,* one in a million or 10^{-6}) of an individual developing cancer over a lifetime, above the background risk, as a result of the exposure. This risk is referred to as the lifetime incremental excess cancer risk. For each pathway, cancer risk was calculated by multiplying the lifetime average daily dose by the cancer slope factor or for inhalation exposure pathways, by multiplying the lifetime average daily exposure by the unit risk. The total risks for a given receptor were then calculated by summing risks for the different complete pathways for a given receptor.

2.4.3 Risk Associated with Exposure to Lead

It should be noted that risk associated with exposure to lead was not evaluated in this mini risk assessment. The maximum lead concentration of 3,470 mg/kg was detected in SS71-16 at SEAD-71. Lead concentrations in all the other SEAD-59 or SEAD-71 in-place samples were below 1,250 mg/kg.

For the SEAD-59 stockpile samples, the maximum lead concentration of 1,440 mg/kg was detected in WS-59-01-016-10. Lead concentrations in all the other stockpile samples were below 400 mg/kg.

3. Human Health Mini Risk Assessment Results for SEAD-59

Tables 6A, 7A, 8A, and 9A present the risk calculation for receptors exposed to COPCs at SEAD-59. Table 10A presents a summary of the potential risks for receptors at SEAD-59.

Table 10A indicates that total potential non-cancer risks (represented by the hazard index) are above the USEPA non-cancer risk limit of 1 for all receptors. The hazard indices are: 2 for industrial worker; 8 for construction worker; and 10 for child at an on-site day care center. Ingestion of soil, dermal contact with soil, and inhalation of dust in ambient air contribute 98.6%, 0.9%, and 0.5%, respectively, to the total HI for child at an on-site day care center. The EPCs of antimony, iron, and arsenic are the most significant contributors to the elevated non-cancer risks.

Table 10A indicates that total potential cancer risks are above or at the USEPA cancer risk range of $1x10^{-6}$ to $1x10^{-4}$ for industrial worker and child at an on-site day care center. The total excess lifetime cancer risk is 1×10^{-4} for industrial worker; 1×10^{-5} for construction worker; and 2×10^{-4} for child at an on-site day care center. Ingestion of soil, dermal contact with soil, and inhalation of dust in ambient air contribute 77%, 23%, and 0%, respectively, to the total cancer risk for child at an on-site day care center. Benzo(a)pyrene, arsenic, and dibenz(a,h)anthracene are the predominant contributors to the elevated cancer risks.

Figure 1 presents the risk-driving sample locations and risk-driving COPC concentrations at SEAD-59. These include the maximum hit of benzo(a)pyrene, arsenic, antimony, and iron. Benzo(a)pyrene was selected as a representative COPC for carcinogenic PAHs. The second and the third highest concentrations for benzo(a)pyrene and the second highest concentration for arsenic are also shown in Figure 1. In addition, sample locations with benzo(a)pyrene equivalent concentrations greater than 10 mg/kg are illustrated in Figure 1. Benzo(a)pyrene equivalent concentration results are discussed in Section 6.

4. Human Health Mini Risk Assessment Results for SEAD-71

Tables 6B, 7B, 8B, and 9B present the risk calculation for receptors exposed to COPCs at SEAD-71. Table 10B presents a summary of the potential risks for receptors at SEAD-71.

Table 10B indicates that total potential non-cancer risks (represented by the hazard index) are at or above the USEPA non-cancer risk limit of 1 for all receptors. The hazard indices are: 1 for industrial worker; 5 for construction worker; and 6 for child at an on-site day care center. Ingestion of soil, dermal contact with soil, and inhalation of dust in ambient air contribute 93.5%, 5.2%, and 1.3%, respectively, to the total HI for a child at an on-site day care center. The metals such as iron, arsenic, antimony, manganese, thallium, and vanadium are the most significant contributors to the elevated non-cancer risks.

Table 10B indicates that total potential cancer risks are above the USEPA cancer risk range of $1x10^{-6}$ to $1x10^{-4}$ for industrial worker and child at an on-site day care center. The total excess lifetime cancer risk is 9×10^{-4} for industrial worker; 9×10^{-5} for construction worker; and 1×10^{-3} for child at an on-site day care center. Ingestion of soil, dermal contact with soil, and inhalation of dust in ambient air contribute 74%, 26%, and 0%, respectively, to the total cancer risk for child at an on-site day care center. Benzo(a)pyrene, arsenic, and dibenz(a,h)anthracene are the predominant contributors to the elevated cancer risks.

It should be noted that lead was not included in this mini risk assessment. A high hit of 3,470 mg/kg was detected in a surface soil sample (SS71-16) at SEAD-71. Further evaluation for lead is warranted.

Figure 2 presents the risk-driving sample locations and risk-driving COPC concentrations at SEAD-71. These include the maximum hit of arsenic, antimony, iron, manganese, thallium, and vanadium. Benzo(a)pyrene equivalent concentrations greater than 10 mg/kg are shown to represent the carcinogenic PAH results. Benzo(a)pyrene equivalent concentration results are discussed in Section 6.

5. Human Health Mini Risk Assessment Results for SEAD-59 Stockpile Samples

Tables 6C, 7C, 8C, and 9C present the risk calculation for receptors exposed to COPCs present in the SEAD-59 stockpile samples. Table 10C presents a summary of the potential risks for receptors at SEAD-59.

Table 10C indicates that total potential non-cancer risks (represented by the hazard index) are above the USEPA non-cancer risk limit of 1 for construction worker and child at an on-site day care center. The hazard indices are: 0.7 for industrial worker; 4 for construction worker; and 3 for child at an on-site day care center. Ingestion of soil, dermal contact with soil, and inhalation of dust in ambient air contribute 97.2%, 0.7%, and 2.1%, respectively, to the total HI for construction worker. The EPCs of antimony, iron, and vanadium are the most significant contributors to the elevated non-cancer risks.

Table 10C indicates that total potential cancer risks are above or at the USEPA cancer risk range of $1x10^{-6}$ to $1x10^{-4}$ for industrial worker and child at an on-site day care center. The total excess lifetime cancer risk is 1×10^{-4} for industrial worker; 1×10^{-5} for construction worker; and 2×10^{-4} for child at an on-site day care center. Ingestion of soil, dermal contact with soil, and inhalation of dust in ambient air contribute 73%, 27%, and 0%, respectively, to the total cancer risk for child at an on-site day care center. Benzo(a)pyrene, arsenic, and dibenz(a,h)anthracene are the predominant contributors to the elevated cancer risks.

Table 11 presents a summary of the risk-driving COPC concentrations for the SEAD-59 stockpile samples. These include the maximum hit of lead, iron, and vanadium and the top three highest hits of antimony. Benzo(a)pyrene equivalent concentrations greater than 10 mg/kg are presented to represent the carcinogenic PAH results. Benzo(a)pyrene equivalent concentration results are discussed in Section 6.

6. Comparison to NYSDEC's Clean up Goal for Carcinogenic PAHs

In addition to conducting a mini risk assessment, the carcinogenic PAH (cPAH) concentrations for samples were compared to a level of 10 mg/kg, a cleanup goal for carcinogenic PAHs recommended by NYSDEC at a different site at SEDA. In performing the comparison, the benzo(a)pyrene (BAP) toxicity equivalent concentrations of cPAHs was calculated for each sample. There are seven PAHs that are considered as carcinogenic PAHs by NYSDEC and New York State Department of Health (NYSDOH): benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. As a screening tool, a benzo(a)pyrene toxicity equivalence can be used to screen PAHs in soil. This toxicity equivalence is based on the relative toxicity of the cPAHs, as cited by USEPA Integrated Risk Information System (IRIS) Database. The benzo(a)pyrene toxicity equivalent concentration is calculated by multiplying the concentration of the individual cPAHs in each sample by the following factors (based on IRIS):

Benzo(a)pyrene	1
Dibenzo(a,h)anthracene	1
Benzo(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Indeno(1,2,3-cd)pyrene	0.1
Benzo(k)fluoranthene	0.01
Chrysene	0.01

A higher multiplier represents a greater carcinogenic health risk.

At SEAD-59, three samples exceeded the 10 mg/kg benchmark with values of 20.9 mg/kg, 11.5 mg/kg, and 10.2 mg/kg benzo(a)pyrene equivalent concentrations (see table below). All these samples were stockpile windrow samples and the associated stockpiles were later backfilled at SEAD-59. The maximum toxicity equivalent value (20.9 mg/kg benzo(a)pyrene equivalent) was calculated for sample FD-59-WS-07, which is a duplicate of sample WS-59-01-015-13. The toxicity equivalence of the average concentrations of cPAHs for the duplicate pair is 11.9 mg/kg. It should be noted that there is a great degree of variance between the concentrations detected in the field sample and the concentrations detected in the field duplicate.

Sample Location	BaP conc (ppb)	BaP Equiv	Is it a duplicate?	BaP conc. of duplicate (ppb)	Equiv of duplicate pair (ppb)
FD-59-WS-07	14000 J	**20,860**	Y (WS-59-01-015-13)	2100 J	**11,943**
FD-59-WS-6	8400 J	**11,530**	Y (WS-59-01-012-1)	2100 J	**7,254**
WS-59-01-013-1	7000	**10,201**	N	NA	**NA**

At SEAD-71, the benzo(a)pyrene equivalent concentrations exceeded the benchmark of 10 mg/kg in ten samples. Two of the samples (CL-71-C-WS1 and CL-71-E2-WE1) were collected during the TCRA (with benzo(a)pyrene equivalent concentrations of 13.3 mg/kg and 13.2 mg/kg, respectively). The remaining eight samples (SS71-6, -11, -12, -13, -15, -16, -17, and TP71-1) are from historical samples collected during the RI or ESI, and these sample locations were not within the excavation limit of the TCRA. The maximum benzo(a)pyrene equivalent concentration at SEAD-71 was 178.1 mg/kg in sample SS71-11. The benzo(a)pyrene equivalent concentration was greater than 100 mg/kg in four samples that were collected during the RI effort (i.e., SS71-11, -13, -16, -17). Figure 2 shows the locations of the ten samples with BAP equivalent concentrations above 10 mg/kg.

For SEAD-59 stockpile samples, the benzo(a)pyrene equivalent concentrations exceeded the benchmark of 10 mg/kg in 15 samples. Table 11 presents a summary of carcinogenic PAH concentrations for these 15 samples. The maximum benzo(a)pyrene equivalent concentration for SEAD-59 stockpile samples was 22.4 mg/kg in WS-59-01-011-7.

7. Preliminary Analysis of Risk-Driving COPCs and Locations

7.1 SEAD-59

Based on the mini risk assessment results, benzo(a)pyrene and other carcinogenic PAHs, arsenic, antimony, and iron are the predominant risk contributors.

The maximum benzo(a)pyrene concentration (14 mg/kg) was detected at FD-59-WS-07 (a duplicate of backfilled windrow sample WS-59-01-015-13). The benzo(a)pyrene was detected at 2.1 mg/kg in WS-

59-01-015-13. The next highest benzo(a)pyrene concentration (8.4 mg/kg) was detected in FD-59-WS-6 (a duplicate of backfilled windrow sample WS-59-01-013-1).

The maximum arsenic concentration (32.2 mg/kg) was detected in a TCRA confirmatory sample CL-59-01-WN2. The next highest arsenic concentration (16.7 mg/kg) was detected in another TCRA confirmatory sample CL-59-01-WN3. The maximum Seneca background concentration for arsenic is 21.5 mg/kg and the average background concentration is 5.2 mg/kg.

An antimony hit of 424 mg/kg in a historical subsurface sample at location SB59-4 contributes to the elevated noncancer risk at the site. The maximum Seneca background concentration for antimony is 6.55 mg/kg.

The BAP equivalent concentrations for the following samples at SEAD-59 exceeded the NYSDEC cleanup goal of 10 mg/kg: FD-59-WS-07 (a duplicate of backfilled windrow sample WS-59-01-015-13), FD-59-WS-6 (a duplicate of backfill sample WS-59-01-012-1), and a backfill sample WS-59-01-013-1. The BAP equivalent concentrations were 20.9 mg/kg, 11.5 mg/kg, and 10.2 mg/kg, respectively.

7.2 SEAD-71

Based on the mini risk assessment results, benzo(a)pyrene and other PAHs are the predominant contributors to the cancer risks and iron, antimony, arsenic, manganese, thallium, vanadium and other metals are the predominant contributors to the noncancer risks. Although risks associated with lead exposure were not evaluated in this mini risk assessment, it should be noted that lead concentration was 3,470 mg/kg at SS71-16. Lead concentrations were below 1250 mg/kg at all the other locations.

The BAP equivalent concentrations for two TCRA confirmatory samples (CL-71-C-WS1 and CL-71-E2-WE1) exceeded the NYSDEC cleanup goal (13 mg/kg vs. 10 mg/kg). In addition, the BAP equivalent concentrations for eight historical samples (SS71-6, -11, -12, -13, -15, -16, -17, and TP71-1) at SEAD-71 exceeded the NYSDEC cleanup goal of 10 mg/kg. The BAP equivalent concentrations ranged from 24.3 mg/kg to 178 mg/kg for these referenced historical samples. Most of these referenced samples were within the fenced area at the east portion of the site. It should be noted that the reporting limits for some of these samples were elevated (e.g., reporting limits as high as 72 mg/kg were observed). The locations of the samples with BAP equivalent concentrations above 10 mg/kg are presented in Figure 2.

7.3 SEAD-59 Stockpile

Based on the mini risk assessment results, benzo(a)pyrene and other PAHs are the predominant contributors to the cancer risks and iron, antimony, vanadium, and other metals are the predominant contributors to the noncancer risks. Although risks associated with lead exposure were not evaluated in this mini risk assessment, it should be noted that lead concentration was 1,440 mg/kg at WS-59-01-016-10. Lead concentrations were below 400 mg/kg for all the other stockpile samples.

The BAP equivalent concentrations for 15 stockpile samples (Table 11) were above the NYSDEC cleanup goal of 10 mg/kg. The BAP equivalent concentrations ranged from 10.0 mg/kg to 22.4 mg/kg for these stockpile samples.

The maximum iron concentration (26,500 mg/kg) was detected in the stockpile sample WS-59-01-008-2. It should be noted that the average background iron concentration for Seneca is 24,700 mg/kg. Therefore, the iron concentrations observed in the stockpile samples might be consistent with Seneca background.

An antimony hit of 43.9 mg/kg for stockpile sample WS-59-01-015-14 contributes to the elevated noncancer risk at the site. The next two highest antimony concentrations of 15.6 mg/kg and 12 mg/kg were observed for WS-59-01-011-5 and WS-59-01-015-16. The maximum Seneca background concentration for antimony is 6.55 mg/kg.

A vanadium hit of 35.4 mg/kg for stockpile sample WS-59-01-007-10 contributes to the elevated noncancer risk at the site. It should be noted that the maximum Seneca background concentration for vanadium is 32.7 mg/kg.

Table 11 presents a summary of the risk-driving COPC concentrations for the SEAD-59 stockpile samples.

8. Conclusions

The following conclusions can be made based on the results of the data analysis and mini-risk assessment performed.

(1) There are potentially elevated risks (i.e. compared with the USEPA target risk limits and NYSDEC BAP toxicity equivalent limit of 10 mg/kg) at SEAD-59 and SEAD-71 due primarily to the presence of benzo(a)pyrene and other carcinogenic PAHs, and metals.

(2) There are potentially elevated risks due primarily to benzo(a)pyrene and other PAHs, and metals (i.e. compared with the USEPA target risk limits and NYSDEC BAP equivalent limit of 10 mg/kg) associated with samples located in four of the five stockpiles staging areas located at SEAD-59.

(3) It is difficult to determine the location of some samples driving the risk assessment, especially the vertical location and stockpile sample locations.

(4) Completing a baseline risk assessment could show that risk is within acceptable levels at SEAD-59 and determine what portions of the stockpiles may be backfilled.

(5) PAH concentrations within the fenced area at SEAD-71 are elevated; BAP toxicity equivalent concentrations exceed 100 mg/kg in several samples. This area was not included in the TCRA at SEAD-71. Railroad tracks exist to the north, south and within this area. Levels of PAHs in this area most likely will cause unacceptable risk at this site, even if a baseline risk assessment is performed.

9. Recommendations

The Army's objective at these sites is to issue an Institutional Control Record of Decision (ROD) as soon as possible. The best chances of gaining regulatory approval for this action is to demonstrate that (1) there is no unacceptable risk at either site to future receptors; (2) the average BAP Toxicity Equivalent concentration at both sites is below 10 mg/kg, and 3) the stockpiles remaining at SEAD-59 do not contribute to risk at the site. The following summarizes Parsons recommendations to support the Army in this objective.

(1) Conduct baseline risk assessment at SEAD-59 to show that risks to future users of this site are within acceptable ranges. Although the mini-risk assessment results indicated that risks were unacceptable, many conservative assumptions were made. Review of the data indicates that in using more realistic assumptions in a baseline risk assessment, a substantial portion of the risks may be eliminated.

(2) Separate the portion of SEAD-71 that is fenced in from the area where the TCRA was conducted. Conduct a baseline risk assessment for the area where the TCRA was conducted to show that risks to future users of this site are within acceptable ranges. Although the mini risk assessment results indicated that risks were unacceptable, many conservative assumptions were made. In addition, most of the elevated PAH levels were from samples located within the fenced area at the eastern area of the site. By treating this area separately, site risks within the area excavated during the TCRA will be reduced considerably.

(3) Discuss alternatives for complying with the BAP Toxicity Equivalent with NYSDEC at these sites. Several confirmatory samples within the area that were excavated during the TCRA have a BAP Toxicity Equivalent greater than 10 mg/kg, the clean up goal recommended by NYSDEC for SEAD-11. In order to bring site concentrations below this level, a site average, rather than a point-by-point comparison may need to be used. Table 12 shows the average BAP Toxicity Equivalent for each site and stockpile. Alternatively, if NYSDEC would accept a higher clean up goal at this industrial site or allow the establishment of a background dataset for cPAHs, the BaP Toxicity Equivalent may be acceptable within the excavated area of the site.

(4) Discuss establishment of a PAH background concentration within the fenced area at SEAD-71 to use in comparison to levels of PAHs within the fenced area at the eastern end. Several locations within this area have BaP Toxicity Equivalent values over 100 mg/kg. Alternatively, hot spot removal of surficial PAHs within the fenced area could be considered if a reasonable clean up goal and excavation limits were agreed upon with NYSDEC and EPA.

(5) If specific windrow and lots within stockpiles can be identified at the site, identify those stockpiles from which risk driving constituents were identified. Separate and conduct additional sampling for disposal purposes. Conduct an alternate baseline risk assessment at SEAD-59 by adding samples from the remaining backfill dataset. If risk is acceptable, backfill remainder of stockpiles on site. If risk is unacceptable, review disposal options.

(6) Conduct a baseline risk assessment at SEAD-59 by adding the stockpile data to the SEAD-59 dataset.

<u>Baseline Risk Assessment Components</u>

Parsons recommends conducting a baseline risk assessment to support an IC ROD at SEAD-59/71. The baseline risk assessment will incorporate the following components to 1) represent more realistic conditions at the site; and 2) comply with USEPA risk assessment protocols. The baseline risk assessment will supplement the mini risk assessment in the following aspects:

1) site-specific assumptions will be used to evaluate potential risks;
2) the 95% upper confidence limit of the mean (rather than the maximum value) will be used as the exposure point concentration
3) separate exposure point concentrations will be determined for surface soils and subsurface soils, when possible. The lack of elevation information from the TCRA data limits Parsons ability to do this and could result in an overestimation of risk in surface soils if all soils must be considered.
4) exposure via groundwater contact will be included;
5) a residential scenario will be included for comparison purposes;
6) an ecological risk assessment will be included;

7) background concentrations of metals will be considered in the risk management stage for setting up cleanup goal or proposing further action for the sites; and
8) exposure to lead in soil will be included.

At this time, Parsons would like to request that Optional Task 2 (Baseline Risk Assessment) under contract DACA87-02-D-0005, Delivery Order 13 be made available for the purpose of conducting the baseline risk assessment and executing the recommendations made in this letter.

Should you have any questions, please do not hesitate to call me at (617) 457-7905 to discuss them.

Sincerely,

for Todd Heino

Todd Heino, P.E.
Program Manager

Enclosure

cc:	S. Absolom, SEDA	K. Healy, USACE, Huntsville
	J. Fallo, USACE, USACE NY District	Tom Battaglia, USACE NY District
	C. Boes, AEC	K. Hoddinott, USACHPPM

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Table 1A
In-Place Samples - SEAD-59
Seneca Army Depot Activity

TCRA Confirmatory Sample [1]		TCRA Backfilled Windrow Sample [2]		Historical Sample [3]	Fill Material [1]
CL-59-01-F01	CL-59-03-WN3	WS-59-01-004-7	WS-59-03-002-2	MW59-4 (59055)	FM-01
FD-71-CL-04	CL-59-03-WS1	WS-59-01-006-11	WS-59-03-002-3	SB59-1 (SB59-1-01)	FM-02
CL-59-01-F02	CL-59-03-WS2	WS-59-01-006-2	WS-59-03-002-4	SB59-1 (SB59-1-08)	
CL-59-01-F03	CL-59-03-WS3	WS-59-01-006-4	WS-59-04-010-1	SB59-1 (SB59-1-04)	
CL-59-01-F04	CL-59-03-WW1	WS-59-01-006-5	WS-59-04-010-10	SB59-1 (SB59-1-06)	
CL-59-01-F05	CL-59-04-F01	WS-59-01-006-6	WS-59-04-010-11	SB59-11 (59132)	
CL-59-01-F06	CL-59-04-F04	WS-59-01-006-8	WS-59-04-010-3	SB59-13 (59060)	
CL-59-01-F07	CL-59-04-WE1	WS-59-01-007-3	WS-59-04-010-4	SB59-15 (59061)	
CL-59-01-F08	CL-59-04-WN1	WS-59-01-007-4	WS-59-04-010-5	SB59-17 (59131)	
CL-59-01-F09	CL-59-04-WN2	WS-59-01-007-7	WS-59-04-010-6	SB59-17 (59068)	
CL-59-01-F10	CL-59-04-WS1	WS-59-01-007-9	WS-59-04-010-7	SB59-18 (59127)	
FD-59-CL-06	CL-59-04-WS2	WS-59-01-011-3	WS-59-04-010-9	SB59-2 (SB59-2-02)	
CL-59-01-F11	CL-59-04-WW1	WS-59-01-011-4	WS-59-OtherC-001-1	SB59-2 (SB59-2-04)	
CL-59-01-F12	CL-59-OTHERA-F01	WS-59-01-012-1		SB59-20 (59107)	
CL-59-01-F13	CL-59-OTHERA-WE1	FD-59-WS-6		SB59-20 (59066)	
CL-59-01-F14	CL-59-OTHERA-WN1	WS-59-01-013-1		SB59-21 (59067)	
CL-59-01-F15	CL-59-OTHERA-WS1	WS-59-01-013-3		SB59-3 (SB59-3-04)	
CL-59-01-F16	WW1	WS-59-01-013-4		SB59-4 (SB59-4-05)	
CL-59-01-F17	CL-59-OTHERB-F01	WS-59-01-013-5		SB59-4 (SB59-4-10)	
CL-59-01-F18	CL-59-OTHERB-WE1	WS-59-01-013-6		SB59-5 (SB59-5-03)	
CL-59-01-F19	CL-59-OTHERB-WN1	WS-59-01-013-7		SB59-5 (SB59-5-06)	
CL-59-01-F20	CL-59-OTHERB-WS1	WS-59-01-014-1		SB59-8 (59057)	
CL-59-01-F21	CL-59-OTHERB-WW1	WS-59-01-014-2		SB59-9 (59059)	
CL-59-01-F22	CL-59-OTHERC-F01	WS-59-01-014-3		SB59-9 (59089)	
CL-59-01-F23	CL-59-OTHERC-WE2	WS-59-01-014-4		SB59-9 (59085)	
FD-59-CL-7	CL-59-OTHERC-WN1	WS-59-01-015-1		TP59-11A-2 (59026)	
CL-59-01-F24	FD-59-CL-01	WS-59-01-015-10		TP59-13A-1 (59010)	
CL-59-01-F25	CL-59-OTHERC-WS1	WS-59-01-015-11		TP59-13C-1 (59015)	
CL-59-01-F26	CL-59-OTHERC-WW1	WS-59-01-015-13		TP59-15-5 (59035)	
CL-59-01-WE1		FD-59-WS-07		TP59-16-1 (59036)	
CL-59-01-WE2		WS-59-01-015-18		TP59-17-3 (59044)	
CL-59-01-WE3		WS-59-01-015-19		TP59-2 (TP59-2)	
CL-59-01-WE4		WS-59-01-015-2		TP59-5 (TP59-5)	
CL-59-01-WE5		WS-59-01-015-5		TP59-6-2 (59002)	
CL-59-01-WN1		WS-59-01-015-6		TP59-8-2 (59050)	
CL-59-01-WN2		WS-59-01-015-7		TP59-9-2 (59052)	
CL-59-01-WN3		WS-59-01-015-9			
CL-59-01-WN4		WS-59-01-016-11			
CL-59-01-WN5		WS-59-01-016-12			
CL-59-01-WN6		WS-59-01-016-15			
CL-59-01-WS1		FD-59-WS-8			
FD-59-CL-05		WS-59-01-016-16			
CL-59-01-WS2		WS-59-01-016-17			
CL-59-01-WS3		WS-59-01-016-7			
CL-59-01-WS4		WS-59-01-016-8			

Table 1A
In-Place Samples - SEAD-59
Seneca Army Depot Activity

TCRA Confirmatory Sample [1]		TCRA Backfilled Windrow Sample [2]		Historical Sample [3]	Fill Material [1]
CL-59-01-WS5		WS-59-01-017-1			
CL-59-01-WS6		WS-59-01-017-2			
CL-59-01-WW1		WS-59-01-018-1			
CL-59-01-WW2		WS-59-01-018-2			
CL-59-01-WW3		WS-59-01-018-3			
CL-59-01-WW4		WS-59-01-018-4			
FD-59-CL-3		WS-59-01-018-5			
CL-59-02-F01		WS-59-01-018-6			
CL-59-02-F02		WS-59-01-018-7			
FD-59-CL-02		WS-59-01-018-8			
CL-59-02-WE1		WS-59-02-002-1			
CL-59-02-WE2		WS-59-02-002-2			
CL-59-02-WN1		WS-59-02-002-3			
CL-59-02-WN2		WS-59-02-003-1			
CL-59-02-WS1		WS-59-02-003-2			
CL-59-02-WS2		WS-59-02-003-3			
CL-59-02-WW1		WS-59-02-003-4			
CL-59-02-WW2		WS-59-02-003-5			
CL-59-03-F01		WS-59-02-004-1			
CL-59-03-F02		WS-59-03-001-1			
CL-59-03-F03		WS-59-03-001-2			
CL-59-03-WE1		WS-59-03-001-3			
CL-59-03-WN1		FD-59-WS-01			
CL-59-03-WN2		WS-59-03-002-1			

Notes:

1. List of samples was derived based on Table 1 of the Final Draft Removal Report (ENSR, 2002). Field duplicates were not presented in Table 1 of the ENSR report but are included here based on the review of the sample chain of custody reports. CL-59-OTHERC-WE1 is presented in Table 1 of the ENSR report but is not included in this table based on the review of notations made in the ENSR report.

2. List of samples comprises all TCRA windrow samples marked as backfilled in Table 1 of the ENSR report. Field duplicates were not presented in Table 1 of the ENSR report but are included here based on the review of the sample chain of custody reports.

3. List of samples was derived based on the evaluation of all soil data collected during the Expanded Site Inspection and Phase I Remedial Investigation. Samples with associated soil considered in-place were included in this table. Sample location is listed with sample ID presented in the parenthesis.

Table 1B
In-Place Samples - SEAD-71
Seneca Army Depot Activity

TCRA Confirmatory Sample [1]		TCRA Backfilled Windrow Sample [2]	Historical Sample [3]		Fill Material [1]
CL-71-A-F01	CL-71-D-WE1	WS-71-A-009-9	SS71-1 (71013)	SS71-6 (71028)	FM-01
CL-71-A-WE1	CL-71-D-WN1	WS-71-B-009-6	SS71-10 (71017)	SS71-8 (71019)	FM-02
CL-71-A-WN1	CL-71-D-WS1	WS-71-B-009-8	SS71-11 (71024)	SS71-9 (71018)	
CL-71-A-WS1	CL-71-D-WW3	WS-71-D-009-2	SS71-12 (71023)	TP71-1 (TP71-1-1)	
CL-71-A-WW1	CL-71-E1-F01	WS-71-D-009-13	SS71-13 (71027)	TP71-1 (TP71-1-2)	
CL-71-B-F01	CL-71-E1-WE1	WS-71-E1-009-3	SS71-14 (71025)	TP71-1 (TP71-1-3)	
CL-71-B-WE2	CL-71-E1-WN1	WS-71-E3-009-10	SS71-15 (71032)	TP71-1 (TP71-1-4)	
CL-71-B-WN1	CL-71-E1-WS1		SS71-16 (71021)	TP71-2 (TP71-2-1)	
CL-71-B-WS1	CL-71-E1-WW1		SS71-17 (71030)	TP71-2 (TP71-2-2)	
CL-71-B-WW1	CL-71-E2-F01		SS71-18 (71022)	TP71-2 (TP71-2-3)	
CL-71-B-WW2	CL-71-E2-WE1		SS71-19 (71020)	TP71-2 (TP71-2-4)	
CL-71-C-F01	CL-71-E2-WN1		SS71-2 (71014)	TP71-3-1 (71002)	
CL-71-C-F02	CL-71-E2-WS1		SS71-20 (71031)	TP71-3-2 (71003)	
CL-71-C-WE1	CL-71-E2-WW1		SS71-3 (71015)	TP71-4-2 (71006)	
CL-71-C-WE2	CL-71-E3-F01		SS71-4 (71016)	TP71-5-1 (71007)	
CL-71-C-WN1	CL-71-E3-WE1		SS71-5 (71029)	TP71-6-1 (71010)	
CL-71-C-WS1	CL-71-E3-WN1				
CL-71-C-WW2	CL-71-E3-WS1				
CL-71-D-F01	CL-71-E3-WW1				

Notes:

1. List of samples was derived based on Table 1 of the Final Draft Removal Report (ENSR, 2002). Field duplicates were not presented in Table 1 of the ENSR report but are included here based on the review of the sample chain of custody reports. The following four confirmatory samples presented in Table 1 of the ENSR report are not included in this table based on the review of notations made in the ENSR report: CL-71-B-WE1, CL-71-C-WW1, CL-71-D-WW1, and CL-71-D-WW2.

2. List of samples comprises all TCRA windrow samples marked as backfilled in Table 1 of the ENSR report. Field duplicates were not presented in Table 1 of the ENSR report but are included here based on the review of the sample chain of custody reports. Sample WS-71-E1-009-3 was designated as stockpile in Table 1 of the ENSR report; however, the 10/31/02 note presented in the report indicated the referenced windrow was backfilled. Based on this note and the fact that no excavated material was observed stockpiled at SEAD-71, soil associated with WS-71-E1-009-3 was assumed backfilled.

3. List of samples was derived based on the evaluation of all soil data collected during the Expanded Site Inspection and Phase I Remedial Investigation. Samples with associated soil considered in-place were included in this table. Sample location is listed with sample ID presented in the parenthesis.

Table 1C
Stockpile Samples - SEAD-59
Seneca Army Depot Activity

No.	TCRA Stockpile Sample
1	WS-59-01-005-4
2	WS-59-01-005-5
3	WS-59-01-006-1
4	WS-59-01-006-12
5	FD-59-WS-03
6	WS-59-01-006-3
7	WS-59-01-006-7
8	WS-59-01-006-9
9	WS-59-01-007-1
10	WS-59-01-007-10
11	WS-59-01-007-11
12	WS-59-01-007-12
13	WS-59-01-007-13
14	WS-59-01-007-14
15	WS-59-01-007-2
16	WS-59-01-007-5
17	WS-59-01-007-6
18	WS-59-01-007-8
19	WS-59-01-008-1
20	WS-59-01-008-2
21	WS-59-01-008-3
22	WS-59-01-011-1
23	WS-59-01-011-2
24	WS-59-01-011-5
25	WS-59-01-011-6
26	WS-59-01-011-7
27	WS-59-01-011-8
28	WS-59-01-011-9
29	WS-59-01-012-2
30	WS-59-01-012-3
31	WS-59-01-013-2
32	WS-59-01-014-5
33	WS-59-01-015-14
34	WS-59-01-015-15
35	WS-59-01-015-16
36	WS-59-01-015-17
37	WS-59-01-015-20
38	WS-59-01-015-3
39	WS-59-01-015-4
40	WS-59-01-015-8
41	WS-59-01-016-1
42	WS-59-01-016-10
43	WS-59-01-016-13
44	WS-59-01-016-14
45	WS-59-01-016-18
46	WS-59-01-016-19
47	WS-59-01-016-2
48	WS-59-01-016-20
49	WS-59-01-016-3
50	WS-59-01-016-4
51	WS-59-01-016-5
52	WS-59-01-016-6
53	WS-59-01-016-9
54	WS-59-04-010-8

Note:
All samples marked as stockpile in Table 1 of the ENSR report are included in the list.
Field duplicates were not presented in Table 1 of the ENSR report but are included here based on the review of the sample chain of custody reports.

Table 2A
COPC Identification - SEAD-59
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	Number of Detects	Sample Number	Maximum Detected Concentration (mg/kg)	EPA Region III RBC [1] (mg/kg)	Is Max > RBC?	Is Max > 0.1RBC?	Retained as COPC?	Rationale
VOC								
1,1-Dichloroethene	3	214	0.008	390	NO	NO	NO	Max<Screening
Acetone	52	214	0.55	7000	NO	NO	NO	Max<Screening
Benzene	8	214	0.006	12	NO	NO	NO	Max<Screening
Carbon disulfide	6	214	0.004	780	NO	NO	NO	Max<Screening
Cyclohexane	8	106	0.003				NO	No Region III RBC available, no toxicity information, low detection frequency
Ethyl benzene	4	214	0.11	780	NO	NO	NO	Max<Screening
Meta/Para Xylene	3	77	0.013	1600	NO	NO	NO	Max<Screening
Methyl Acetate	3	106	0.002	7800	NO	NO	NO	Max<Screening
Methyl chloride	1	137	0.003				NO	No Region III RBC available, no toxicity information, low detection frequency
Methyl cyclohexane	10	106	0.005				NO	No Region III RBC available, no toxicity information, low detection frequency
Methyl ethyl ketone	27	214	0.19	4700	NO	NO	NO	Max<Screening
Methyl isobutyl ketone	1	214	0.0019				NO	No Region III RBC available, no toxicity information, low detection frequency
Methylene chloride	38	214	0.0049	85	NO	NO	NO	Max<Screening
Naphthalene			4	160	NO	NO	NO	Max<Screening
Ortho Xylene	3	77	0.0043	1600	NO	NO	NO	Max<Screening
Tetrachloroethene	5	214	0.0064	1.2	NO	NO	NO	Max<Screening
Toluene	17	214	0.016	1600	NO	NO	NO	Max<Screening
Trichloroethene	8	214	0.0045	1.6	NO	NO	NO	Max<Screening
Trichlorofluoromethane	1	106	0.006	2300	NO	NO	NO	Max<Screening
SVOC								
1,1'-Biphenyl	2	106	0.079	3.90E+02	NO	NO	NO	Max<Screening
2-Methylnaphthalene	49	215	10	31	NO	YES	YES	Max >0.1Screening
4-Chloroaniline	2	215	1.2	31	NO	NO	NO	Max<Screening
4-Methylphenol	7	215	0.15	39	NO	NO	NO	Max<Screening
Acenaphthene	58	215	5.1	470	NO	NO	NO	Max<Screening
Acenaphthylene	80	215	1.7				YES	No Region III RBC available
Anthracene	93	215	8.2	2300	NO	NO	NO	Max<Screening
Atrazine	1	106	0.12	2.9	NO	NO	NO	Max<Screening
Benzaldehyde	1	106	0.05	780	NO	NO	NO	Max<Screening
Benzo(a)anthracene	112	215	16	0.87	YES	YES	YES	Max>Screening
Benzo(a)pyrene	113	215	14	0.087	YES	YES	YES	Max>Screening
Benzo(b)fluoranthene	116	215	12	0.87	YES	YES	YES	Max>Screening
Benzo(ghi)perylene	102	215	9				YES	No Region III RBC available
Benzo(k)fluoranthene	109	215	13	8.7	YES	YES	YES	Max>Screening
Bis(2-Ethylhexyl)phthalate	51	215	0.26	4.6	NO	NO	NO	Max<Screening
Butylbenzylphthalate	2	215	1	1600	NO	NO	NO	Max<Screening
Carbazole	34	138	1.5	32	NO	NO	NO	Max<Screening
Chrysene	114	215	16	87	NO	YES	YES	Max >0.1Screening
Dibenz(a,h)anthracene	80	215	2.9	0.087	YES	YES	YES	Max>Screening
Dibenzofuran	41	215	2.8	16	NO	YES	YES	Max >0.1Screening
Diethylphthalate	10	215	0.012	6300	NO	NO	NO	Max<Screening
Di-n-butylphthalate	14	214	0.12	780	NO	NO	NO	Max<Screening
Di-n-octylphthalate	2	215	0.011	310	NO	NO	NO	Max<Screening

Table 2A
COPC Identification - SEAD-59
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	Number of Detects	Sample Number	Maximum Detected Concentration (mg/kg)	EPA Region III RBC [1] (mg/kg)	Is Max > RBC?	Is Max > 0.1RBC?	Retained as COPC?	Rationale
Fluoranthene	120	215	44	310	NO	YES	YES	Max >0.1Screening
Fluorene	64	215	5	310	NO	NO	NO	Max<Screening
Indeno(1,2,3-cd)pyrene	104	215	8.7	0.87	YES	YES	YES	Max>Screening
Naphthalene	47	215	1.7	160	NO	NO	NO	Max<Screening
N-Nitrosodiphenylamine	1	138	0.1	1.30E+02	NO	NO	NO	Max<Screening
Phenanthrene	115	215	41				YES	No Region III RBC
Phenol	1	215	0.017	2300	NO	NO	NO	Max<Screening
Pyrene	122	214	35	230	NO	YES	YES	Max >0.1Screening
PCB								
Aroclor-1260	2	214	0.079	0.32	NO	YES	YES	Max >0.1Screening
Pesticides								
4,4'-DDD	56	214	0.74	2.7	NO	YES	YES	Max >0.1Screening
4,4'-DDE	77	214	2.6	1.9	YES	YES	YES	Max>Screening
4,4'-DDT	68	214	3.7	1.9	YES	YES	YES	Max>Screening
Aldrin	1	214	0.0012	3.80E-02	NO	NO	NO	Max<Screening
Alpha-Chlordane	2	214	0.034	1.8	NO	NO	NO	Max<Screening
Alpha-BHC	9	214	0.0099	1.00E-01	NO	NO	NO	Max<Screening
Beta-BHC	6	214	0.0036	3.50E-01	NO	NO	NO	Max<Screening
Delta-BHC	4	214	0.0014				NO	No Region III RBC available, no toxicity information, low detection frequency
Dieldrin	1	214	0.0018	4.00E-02	NO	NO	NO	Max<Screening
Endosulfan I	2	214	0.016	47	NO	NO	NO	Max<Screening
Endosulfan II	1	214	0.0071	47	NO	NO	NO	Max<Screening
Endosulfan sulfate	2	214	0.0062	47	NO	NO	NO	Max<Screening
Endrin	4	214	0.016	2.3	NO	NO	NO	Max<Screening
Endrin aldehyde	5	214	0.0063	2.3	NO	NO	NO	Max<Screening
Endrin ketone	5	214	0.038	2.3	NO	NO	NO	Max<Screening
Gamma-Chlordane	16	214	0.024	1.8	NO	NO	NO	Max<Screening
Heptachlor epoxide	5	214	0.0057	7.00E-02	NO	NO	NO	Max<Screening
Metals								
Aluminum	214	214	18300	7800	YES	YES	YES	Max>Screening
Antimony	114	214	424	3.1	YES	YES	YES	Max>Screening
Arsenic	214	214	32.2	0.43	YES	YES	YES	Max>Screening
Barium	214	214	304	550	NO	YES	YES	Max >0.1Screening
Beryllium	210	214	2.6	16	NO	YES	YES	Max >0.1Screening
Cadmium	168	214	3.2	7.8	NO	YES	YES	Max >0.1Screening
Calcium	214	214	214000	1333600	NO	YES	NO	Assumes 166.7 mg/kg-day DRI, Max<Screening
Chromium	214	214	39.3	23	YES	YES	YES	Max>Screening
Cobalt	214	214	47.8	160	NO	YES	YES	Max >0.1Screening
Copper	214	214	305	310	NO	YES	YES	Max >0.1Screening
Iron	214	214	64000	2300	YES	YES	YES	Max>Screening
Lead	214	214	164	400	NO	YES	NO	<400 mg/kg EPA residential screening
Magnesium	214	214	34400	69360	NO	YES	NO	Assumes 8.67 mg/kg-day as DRI, Max<screening
Manganese	214	214	1290	160	YES	YES	YES	Max>Screening
Mercury	191	214	0.95	2.3	NO	YES	YES	Max >0.1Screening
Nickel	214	214	88.3	160	NO	YES	YES	Max >0.1Screening
Potassium	214	214	2520	848000	NO	NO	NO	assumes 106 mg/kg-day as DRI, Max<Screening
Selenium	21	214	1.5	39	NO	NO	NO	Max<Screening

Table 2A
COPC Identification - SEAD-59
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	Number of Detects	Sample Number	Maximum Detected Concentration (mg/kg)	EPA Region III RBC [1] (mg/kg)	Is Max > RBC?	Is Max > 0.1RBC?	Retained as COPC?	Rationale
Silver	94	214	2.9	39	NO	NO	NO	Max<Screening
Sodium	209	214	4060	5360	NO	YES	NO	assumes 0.67mg/kg/d as DRI, Max<screening
Thallium	53	214	1.8	0.55	YES	YES	YES	Max>Screening
Vanadium	214	214	28.5	7.8	YES	YES	YES	Max>Screening
Zinc	214	214	341	2300	NO	YES	YES	Max >0.1Screening
Nitrate/Nitrite Nitrogen	20	20	8.34	780	NO	NO	NO	Max<Screening
Total Petroleum Hydrocarbons	9	20	5.09E+03				NO	Individual compounds were evaluated

Notes:

1. EPA Region III Risk-Based Concentrations normalized to cancer risk of 1 in 10^6 and non-cancer hazard quotient of 0.1.
2. For nutrients such as calcium, sodium, potassium, and sodium, the recommended dietary reference intake (Wright, 2001) values were used as the screening values, DRI = Dietary Reference Intake

COPCs identified for the mini risk assessment

Table 2B
COPC Identification - SEAD-71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	Number of Detects	Sample Number	Maximum Detected Concentration (mg/kg)	EPA Region III RBC [1] (mg/kg)	Is Max>RBC?	Is Max>0.1 RBC?	Retained as COPC?	Rationale
VOC								
1,1,1-Trichloroethane	7	77	0.023	2.20E+03	NO	NO	NO	Max<Screening
Acetone	9	77	0.074	7000	NO	NO	NO	Max<Screening
Benzene	2	77	0.002	12	NO	NO	NO	Max<Screening
Carbon disulfide	3	77	0.005	780	NO	NO	NO	Max<Screening
Cyclohexane	2	24	0.004				NO	No Region III RBC available, no toxicity information, low detection frequency
Ethyl benzene	2	77	0.004	780	NO	NO	NO	Max<Screening
Methyl cyclohexane	3	24	0.006				NO	No Region III RBC available, no toxicity information, low detection frequency
Methylene chloride	12	77	0.011	85	NO	NO	NO	Max<Screening
Styrene	1	56	0.001	1600	NO	NO	NO	Max<Screening
Tetrachloroethene	4	77	0.033	1.2	NO	NO	NO	Max<Screening
Toluene	11	77	0.016	1600	NO	NO	NO	Max<Screening
Total BTEX	4	4	0.0116				NO	Individual compounds were evaluated
Total Xylenes	6	56	0.096	1600	NO	NO	NO	Max<Screening
Trichlorofluoromethane	1	24	0.001	2300	NO	NO	NO	Max<Screening
2,4-Dinitrotoluene	1	78	0.88	16	NO	NO	NO	Max<Screening
SVOC								
2-Methylnaphthalene	17	78	31	31	NO	YES	YES	Max>0.1Screening
4-Nitroaniline	1	56	0.075	32	NO	NO	NO	Max<Screening
Acenaphthene	35	78	42	470	NO	NO	NO	Max<Screening
Acenaphthylene	20	78	1.8				YES	No Region III RBC available
Anthracene	47	78	100	2300	NO	NO	NO	Max<Screening
Benzo(a)anthracene	61	78	150	0.87	YES	YES	YES	Max>Screening
Benzo(a)pyrene	61	78	120	0.087	YES	YES	YES	Max>Screening
Benzo(b)fluoranthene	62	78	88	0.87	YES	YES	YES	Max>Screening
Benzo(ghi)perylene	55	78	62	0	YES	YES	YES	Max<Screening
Benzo(k)fluoranthene	50	78	130	8.7	YES	YES	YES	Max>Screening
Bis(2-Ethylhexyl)phthalate	9	78	0.14	4.6	NO	NO	NO	Max<Screening
Carbazole	33	56	77	32	YES	YES	YES	Max>Screening
Chrysene	64	78	150	87	YES	YES	YES	Max>Screening
Dibenz(a,h)anthracene	45	78	25	0.087	YES	YES	YES	Max>Screening
Dibenzofuran	29	78	38	16	YES	YES	YES	Max>Screening
Di-n-butylphthalate	4	78	0.14	780	NO	NO	NO	Max<Screening
Fluoranthene	66	78	440	310	YES	YES	YES	Max>Screening
Fluorene	32	78	62	310	NO	YES	YES	Max>0.1Screening
Indeno(1,2,3-cd)pyrene	55	78	65	0.87	YES	YES	YES	Max>Screening
Naphthalene	18	78	46	160	NO	YES	YES	Max>0.1Screening
Phenanthrene	61	78	290				YES	No Region III RBC available
Phenol	1	78	0.0045	2300	NO	NO	NO	Max<Screening
Pyrene	64	78	280	230	YES	YES	YES	Max>Screening
PCBs								
Aroclor-1260	3	78	0.2	0.32	NO	YES	YES	Max>0.1Screening
Pesticides								
4,4'-DDD	18	78	0.24	2.7	NO	NO	NO	Max<Screening
4,4'-DDE	31	78	0.81	1.9	NO	YES	YES	Max>0.1Screening
4,4'-DDT	38	78	1.3	1.9	NO	YES	YES	Max>0.1Screening
Alpha-BHC	7	78	0.018	0.1	NO	YES	YES	Max>0.1Screening
Alpha-Chlordane	2	78	0.074	1.8	NO	NO	NO	Max<Screening

Table 2B
COPC Identification - SEAD-71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	Number of Detects	Sample Number	Maximum Detected Concentration (mg/kg)	EPA Region III RBC [1] (mg/kg)	Is Max>RBC?	Is Max>0.1 RBC?	Retained as COPC?	Rationale
Beta-BHC	8	78	0.035	0.35	NO	NO	NO	Max<Screening
Delta-BHC	1	78	0.0018				NO	No Region III RBC available, no toxicity information, low detection frequency
Dieldrin	3	78	0.0035	0.04	NO	NO	NO	Max<Screening
Endosulfan I	11	78	0.2	47	NO	NO	NO	Max<Screening
Endosulfan II	5	78	0.052	47	NO	NO	NO	Max<Screening
Endosulfan sulfate	11	78	0.11	47	NO	NO	NO	Max<Screening
Endrin	12	78	0.12	2.3	NO	NO	NO	Max<Screening
Endrin aldehyde	18	78	0.12	2.3	NO	NO	NO	Max<Screening
Endrin ketone	16	78	0.18	2.3	NO	NO	NO	Max<Screening
Gamma-BHC/Lindane	1	78	0.004				NO	No Region III RBC available, no toxicity information, low detection frequency
Gamma-Chlordane	5	78	0.048	1.8	NO	NO	NO	Max<Screening
Heptachlor	1	78	0.0012	1.40E-01	NO	NO	NO	Max<Screening
Heptachlor epoxide	13	78	0.18	0.07	YES	YES	YES	Max>Screening
Methoxychlor	12	78	0.52	39	NO	NO	NO	Max<Screening
Inorganics								
Aluminum	78	78	18000	7800	YES	YES	YES	Max>Screening
Antimony	37	78	19.3	3.1	YES	YES	YES	Max>Screening
Arsenic	78	78	14.6	0.43	YES	YES	YES	Max>Screening
Barium	78	78	179	550	NO	YES	YES	Max>0.1Screening
Beryllium	77	78	0.88	16	NO	NO	NO	Max<Screening
Cadmium	51	78	12.1	7.8	YES	YES	YES	Max>Screening
Calcium	78	78	295000	1333600	NO	YES	NO	Assumes 166.7 mg/kg-day DRI, Max<Screening
Chromium	78	78	60.3	23	YES	YES	YES	Max>Screening
Cobalt	78	78	14.6	160	NO	NO	NO	Max<Screening
Copper	78	78	134	310	NO	YES	YES	Max>0.1Screening
Iron	78	78	65100	2300	YES	YES	YES	Max>Screening
Lead	78	78	3470	400	YES	YES	YES	Max>Screening
Magnesium	78	78	59300	69360	NO	YES	YES	Max>0.1Screening
Manganese	78	78	1330	160	YES	YES	YES	Max>Screening
Mercury	60	78	2.7	2.3	YES	YES	YES	Max>Screening
Nickel	78	78	110	160	NO	YES	YES	Max>0.1Screening
Potassium	78	78	2940	848000	NO	NO	NO	assumes 106 mg/kg-day as DRI, Max<Screening
Selenium	15	78	1.8	39	NO	NO	NO	Max<Screening
Silver	28	78	2.2	39	NO	NO	NO	Max<Screening
Sodium	74	78	1040	5360	NO	YES	NO	assumes 0.67mg/kg/d as DRI, Max<screening
Thallium	18	78	2.3	0.55	YES	YES	YES	Max>Screening
Vanadium	78	78	29.2	7.8	YES	YES	YES	Max>Screening
Zinc	77	78	3660	2300	YES	YES	YES	Max>Screening
Total Petroleum Hydrocarbons	19	24	9060				NO	Individual compounds were evaluated

Notes:
1. EPA Region III Risk-Based Concentrations normalized to cancer risk of 1 in 106 and non-cancer hazard quotient of 0.1.
2. For nutrients such as calcium, sodium, potassium, and sodium, the recommended dietary reference intake (Wright, 2001) values were used as the screening values, DRI = Dietary Reference Intake

COPCs identified for the mini risk assessment

Table 2C
COPC Identification - SEAD-59 Stockpile Samples
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	Number of Detects	Sample Number	Maximum Detected Concentration (mg/kg)	EPA Region III RBC [1] (mg/kg)	Is Max > RBC?	Is Max > 0.1RBC?	Retained as COPC?	Rationale
VOC								
1,1,2-Trichloro-1,2,2-Trifluoroethane	1	54	0.0015	230000	NO	NO	NO	Max<Screening
1,1-Dichloroethene	1	54	0.001	390	NO	NO	NO	Max<Screening
Acetone	13	54	0.069	7000	NO	NO	NO	Max<Screening
Meta/Para Xylene	2	49	0.0023	1600	NO	NO	NO	Max<Screening
Methyl ethyl ketone	5	54	0.007	4700	NO	NO	NO	No Region III RBC available, no toxicity information, low detection frequency
Methylene chloride	1	54	0.0042	85	NO	NO	NO	Max<Screening
Ortho Xylene	5	49	0.0019	1600	NO	NO	NO	Max<Screening
Tetrachloroethene	3	54	0.0067	1.2	NO	NO	NO	Max<Screening
Total Xylenes	1	5	0.003	1600	NO	NO	NO	Max<Screening
Trichloroethene	5	54	0.0047	1.6	NO	NO	NO	No Region III RBC available, no toxicity information, low detection frequency
SVOC								
1,1'-Biphenyl	1	5	0.059	3.90E+02	NO	NO	NO	Max<Screening
2,4,6-Tribromophenol	15	15	0.099				YES	No Region III RBC available
2-Fluorobiphenyl	15	15	0.087				YES	No Region III RBC available
2-Methylnaphthalene	27	54	1.2	31	NO	NO	NO	Max<Screening
Acenaphthene	47	54	2.4	470	NO	NO	NO	Max<Screening
Acenaphthylene	53	54	3.5				YES	No Region III RBC available
Anthracene	54	54	6.6	2300	NO	NO	NO	Max<Screening
Benzo(a)anthracene	54	54	14	0.87	YES	YES	YES	Max>Screening
Benzo(a)pyrene	54	54	16	0.087	YES	YES	YES	Max>Screening
Benzo(b)fluoranthene	54	54	11	0.87	YES	YES	YES	Max>Screening
Benzo(ghi)perylene	54	54	8				YES	No Region III RBC available
Benzo(k)fluoranthene	54	54	13	8.7	YES	YES	YES	Max>Screening
Bis(2-Ethylhexyl)phthalate	3	54	0.13	4.6	NO	NO	NO	Max<Screening
Carbazole	4	5	1.1	32	NO	NO	NO	Max<Screening
Chrysene	54	54	13	87	NO	YES	YES	Max>0.1Screening
Dibenz(a,h)anthracene	53	54	2.9	0.087	YES	YES	YES	Max>Screening
Dibenzofuran	33	54	1.3	16	NO	NO	NO	Max<Screening
Fluoranthene	54	54	29	310	NO	NO	NO	Max < Screening
Fluorene	48	54	3.1	310	NO	NO	NO	Max < Screening
Indeno(1,2,3-cd)pyrene	54	54	8	0.87	YES	YES	YES	Max > Screening
Naphthalene	33	54	1.2	160	NO	NO	NO	Max<Screening
Pentachlorophenol	1	54	0.66	5.3	NO	YES	YES	Max>0.1Screening
Phenanthrene	54	54	17		YES	YES	YES	Max>Screening
Pyrene	54	54	22	230	NO	NO	NO	Max < Screening
Pesticides								
4,4'-DDD	33	54	0.45	2.7	NO	YES	YES	Max >0.1Screening
4,4'-DDE	33	54	0.23	1.9	NO	YES	YES	Max>0.1Screening
4,4'-DDT	37	54	0.52	1.9	NO	YES	YES	Max>0.1Screening
Alpha-BHC	1	54	0.0044	1.00E-01	NO	NO	NO	Max < Screening
Alpha-Chlordane	6	54	0.027	1.8	NO	NO	NO	Max<Screening
Beta-BHC	1	54	0.013	3.50E-01	NO	NO	NO	Max < Screening
Endrin ketone	1	54	0.015	2.30E+00	NO	NO	NO	Max<Screening
Gamma-Chlordane	5	54	0.021	1.80E+00	NO	NO	NO	No Region III RBC available, no toxicity information, low detection frequency

Table 2C
COPC Identification - SEAD-59 Stockpile Samples
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	Number of Detects	Sample Number	Maximum Detected Concentration (mg/kg)	EPA Region III RBC [1] (mg/kg)	Is Max > RBC?	Is Max > 0.1RBC?	Retained as COPC?	Rationale
Metals								
Aluminum	54	54	13400	7800	YES	YES	YES	Max>Screening
Antimony	11	54	43.9	3.1	YES	YES	YES	Max>Screening
Arsenic	54	54	7.3	0.43	YES	YES	YES	Max>Screening
Barium	54	54	135	550	NO	YES	YES	Max >0.1Screening
Beryllium	54	54	0.69	16	NO	NO	NO	Max < Screening
Cadmium	53	54	1.2	7.8	NO	YES	YES	Max >0.1Screening
Calcium	54	54	100000	1333600	NO	NO	NO	Assumes 166.7 mg/kg-day DRI, Max<Screening
Chromium	54	54	35	23	YES	YES	YES	Max > Screening
Cobalt	54	54	13.9	160	NO	NO	NO	Max < Screening
Copper	54	54	51.8	310	NO	YES	YES	Max >0.1Screening
Iron	54	54	26500	2300	YES	YES	YES	Max>Screening
Lead	54	54	1440	400	YES	YES	YES	Max > Screening
Magnesium	54	54	26600	69360	NO	YES	NO	Assumes 8.67 mg/kg-day as DRI, Max<screening
Manganese	54	54	1220	160	YES	YES	YES	Max>Screening
Mercury	54	54	0.52	2.3	NO	YES	YES	Max >0.1Screening
Nickel	54	54	56.6	160	NO	YES	YES	Max >0.1Screening
Potassium	54	54	1580	848000	NO	NO	NO	assumes 106 mg/kg-day as DRI, Max<Screening
Selenium	2	54	0.72	39	NO	NO	NO	Max<Screening
Silver	9	54	4.7	39	NO	YES	YES	Max > 0.1Screening
Sodium	54	54	525	5360	NO	NO	NO	assumes 0.67mg/kg/d as DRI, Max<screening
Thallium	27	54	0.99	0.55	YES	YES	YES	Max>Screening
Vanadium	54	54	35.4	7.8	YES	YES	YES	Max>Screening
Zinc	54	54	185	2300	NO	NO	NO	Max < Screening

Notes:

1. EPA Region III Risk-Based Concentrations normalized to cancer risk of 1 in 10^6 and non-cancer hazard quotient of 0.1.
2. For nutrients such as calcium, sodium, potassium, and sodium, the recommended dietary reference intake (Wright, 2001) values were used as the screening values, DRI = Dietary Reference Intake

[shaded] COPCs identified for the mini risk assessment

Table 3A
Exposure Point Concentrations for COPCs - SEAD-59
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	EPC (mg/kg)
SVOC	
2-Methylnaphthalene	10
Acenaphthylene	1.7
Benzo(a)anthracene	16
Benzo(a)pyrene	14
Benzo(b)fluoranthene	12
Benzo(ghi)perylene	9
Benzo(k)fluoranthene	13
Chrysene	16
Dibenz(a,h)anthracene	2.9
Dibenzofuran	2.8
Fluoranthene	44
Indeno(1,2,3-cd)pyrene	8.7
Phenanthrene	41
Pyrene	35
PCB	
Aroclor-1260	0.079
Pesticides	
4,4'-DDD	0.74
4,4'-DDE	2.6
4,4'-DDT	3.7
Metals	
Aluminum	18300
Antimony	424
Arsenic	32.2
Barium	304
Beryllium	2.6
Cadmium	3.2
Chromium	39.3
Cobalt	47.8
Copper	305
Iron	64000
Manganese	1290
Mercury	0.95
Nickel	88.3
Thallium	1.8
Vanadium	28.5
Zinc	341

Note: The maximum detected concentration was used as the EPC.

Table 3B
Exposure Point Concentrations for COPCs - SEAD-71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	EPC (mg/kg)
SVOC	
2-Methylnaphthalene	31
Acenaphthylene	1.8
Benzo(a)anthracene	150
Benzo(a)pyrene	120
Benzo(b)fluoranthene	88
Benzo(ghi)perylene	62
Benzo(k)fluoranthene	130
Carbazole	77
Chrysene	150
Dibenz(a,h)anthracene	25
Dibenzofuran	38
Fluoranthene	440
Fluorene	62
Indeno(1,2,3-cd)pyrene	65
Naphthalene	46
Phenanthrene	290
Pyrene	280
PCB	
Aroclor-1260	0.2
Pesticides	
4,4'-DDE	0.81
4,4'-DDT	1.3
Alpha-BHC	0.018
Heptachlor epoxide	0.18
Inorganics	
Aluminum	18000
Antimony	19.3
Arsenic	14.6
Barium	179
Cadmium	12.1
Chromium	60.3
Copper	134
Iron	65100
Lead	3470
Magnesium	59300
Manganese	1330
Mercury	2.7
Nickel	110
Thallium	2.3
Vanadium	29.2
Zinc	3660

Note: The maximum detected concentration was used as the EPC.

Table 3C
Exposure Point Concentrations for COPCs - SEAD-59 Stockpile Samples
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

	EPC (mg/kg)
SVOC	
2,4,6-Tribromophenol	0.099
2-Fluorobiphenyl	0.087
Acenaphthylene	3.5
Benzo(a)anthracene	14
Benzo(a)pyrene	16
Benzo(b)fluoranthene	11
Benzo(ghi)perylene	8
Benzo(k)fluoranthene	13
Chrysene	13
Dibenz(a,h)anthracene	2.9
Indeno(1,2,3-cd)pyrene	8
Pentachlorophenol	0.66
Phenanthrene	17
Pesticides	
4,4'-DDD	0.45
4,4'-DDE	0.23
4,4'-DDT	0.52
Metals	
Aluminum	13400
Antimony	43.9
Arsenic	7.3
Barium	135
Cadmium	1.2
Chromium	35
Copper	51.8
Iron	26500
Lead	1440
Manganese	1220
Mercury	0.52
Nickel	56.6
Silver	4.7
Thallium	0.99
Vanadium	35.4

Note: The maximum detected concentration was used as the EPC.

TABLE 4
EXPOSURE FACTOR ASSUMPTIONS FOR SEAD-59/71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	PARAMETER	RME		BASIS	SOURCE
			VALUE	UNITS		
INDUSTRIAL WORKER	Inhalation of Dust in Ambient Air	Body Weight	70	kg	Default value for adult.	USEPA, 2001a.
		Inhalation Rate	20	m^3/day	Default inhation rate for commercial/industrial worker.	USEPA, 2001a.
		Exposure Frequency	250	days/yr	Default value for indoor worker.	USEPA, 2001a.
	(Air EPC Calculated from Surface Soil Only)	Exposure Duration	25	years	Default value for commercial/industrial worker.	USEPA, 2001a.
		Averaging Time - Nc	9,125	days	25 years.	
		Averaging Time - Car	25,550	days	70 years, default value for human life span.	USEPA, 2001a.
	Ingestion of Soil (Soil EPC Calculated from Surface Soil Only)	Body Weight	70	kg	Default value for adult.	USEPA, 2001a.
		Ingestion Rate	100	mg/day	Default soil ingestion rate for outdoor worker.	USEPA, 2001a.
		Fraction Ingested	1	(unitless)	100% ingestion from site. Conservative assumption.	BPJ.
		Exposure Frequency	250	days/yr	Default value for commercial/industrial worker.	USEPA, 2001a.
		Exposure Duration	25	years	Default value for commercial/industrial worker.	USEPA, 2001a.
		Averaging Time - Nc	9,125	days	25 years.	
		Averaging Time - Car	25,550	days	70 years, default value for human life span.	USEPA, 2001a.
	Dermal Contact of Soil	Body Weight	70	kg	Default value for adult.	USEPA, 2001a.
		Skin Contact Surface Area	3,300	cm^2	The exposed skin surface was limited to face, hands, and forearms.	USEPA, 2001b.
	(Soil EPC Calculated from Surface Soil Only)	Soil to Skin Adherence Factor	0.2	mg/cm^2	Soil to skin adherence factor for RME scenario.	USEPA, 2001b.
		Exposure Frequency	250	days/yr	Default value for indoor worker.	USEPA, 2001a.
		Exposure Duration	25	years	Default value for commercial/industrial worker.	USEPA, 2001a.
		Averaging Time - Nc	9,125	days	25 years.	
		Averaging Time - Car	25,550	days	70 years, default value for human life span.	USEPA, 2001a.

TABLE 4
EXPOSURE FACTOR ASSUMPTIONS FOR SEAD-59/71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	PARAMETER	RME		BASIS	SOURCE
			VALUE	UNITS		
CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	Body Weight	70	kg	Default value for adult.	USEPA, 2001a.
		Inhalation Rate	20	m^3/day	Default inhalation rate for construction worker.	USEPA, 2001a.
		Exposure Frequency	250	days/yr	Site-specific assumption.	BPJ.
	(Air EPC Calculated from Surface and Subsurface Soils)	Exposure Duration	1	year	Site-specific assumption.	BPJ.
		Averaging Time - Nc	365	days	1 year.	
		Averaging Time - Car	25,550	days	70 years, default value for human life span.	USEPA, 2001a.
	Ingestion of Soil	Body Weight	70	kg	Default value for adult.	USEPA, 2001a.
		Ingestion Rate	330	mg/day	Default value for construction worker.	USEPA, 2001a.
	(Soil EPC Calculated from Surface and Subsurface Soils)	Fraction Ingested	1	(unitless)	100% ingestion from site, conservative assumption.	BPJ.
		Exposure Frequency	250	days/yr	Site-specific assumption.	BPJ.
		Exposure Duration	1	year	Site-specific assumption.	BPJ.
		Averaging Time - Nc	365	days	1 year.	
		Averaging Time - Car	25,550	days	70 years, default value for human life span.	USEPA, 2001a.
	Dermal Contact of Soil	Body Weight	70	kg	Default value for adult.	USEPA, 2001a.
		Skin Contact Surface Area	3,300	cm^2	Face, hands, and forearms. Default value for surface area exposed.	USEPA, 2001a,b.
	(Soil EPC Calculated from Surface and Subsurface Soils)	Soil to Skin Adherence Factor	0.3	mg/cm^2	Default value for adherence factor.	USEPA, 2001a.
		Exposure Frequency	250	days/yr	Site-specific assumption.	BPJ.
		Exposure Duration	1	year	Site-specific assumption.	BPJ.
		Averaging Time - Nc	365	days	1 year.	
		Averaging Time - Car	25,550	days	70 years, default value for human life span.	USEPA, 2001a.

TABLE 4
EXPOSURE FACTOR ASSUMPTIONS FOR SEAD-59/71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	PARAMETER	RME		BASIS	SOURCE
			VALUE	UNITS		
CHILD AT ON-SITE DAY CARE CENTER	Inhalation of Dust in Ambient Air	Body Weight	15	kg	Default value for child (ages 0-6yr).	USEPA, 2001a.
		Inhalation Rate	0.87	m^3/day	Average long term inhalation rate for children (0-6yr) is 7.1 m^3/day, Table 5-25. Assuming exposure time 3 hr/day.	USEPA, 1997.
	(Air EPC Calculated from Surface Soil Only)	Exposure Frequency	250	days/yr	Attends 5 days/wk and 10 days/yr vacation.	BPJ.
		Exposure Duration	6	years	Default exposure duration.	USEPA, 2001a.
		Averaging Time - Nc	2,190	days	6 years.	
		Averaging Time - Car	25,550	days	70 years, default value for human life span.	USEPA, 2001a.
	Ingestion of Soil	Body Weight	15	kg	Default value for child (ages 0-6 yr).	USEPA, 2001a.
		Ingestion Rate	200	mg/day	Default soil ingestion rate for a child.	USEPA, 2001a.
	(Soil EPC Calculated from Surface Soil Only)	Fraction Ingested	1	(unitless)	100% ingestion from site, conservative assumption.	BPJ.
		Exposure Frequency	250	days/yr	Attends 5 days/wk and 10 days/yr vacation.	BPJ.
		Exposure Duration	6	years	Default exposure duration.	USEPA, 2001a.
		Averaging Time - Nc	2,190	days	6 years.	
		Averaging Time - Car	25,550	days	70 years, default value for human life span.	USEPA, 2001a.
	Dermal Contact of Soil	Body Weight	15	kg	Default value for child (ages 0-6 yr).	USEPA, 2001a.
		Skin Contact Surface Area	2,800	cm^2	Head, hands, forearms, lower legs, and feet exposed.	USEPA, 2001a,b.
	(Soil EPC Calculated from Surface Soil Only)	Soil to Skin Adherence Factor	0.2	mg/cm^2	Default soil adherence factor for child receptor under RME scenario.	USEPA, 2001a,b.
		Exposure Frequency	250	days/yr	Attends 5 days/wk and 10 days/yr vacation.	BPJ.
		Exposure Duration	6	years	Default exposure duration.	USEPA, 2001a.
		Averaging Time - Nc	2,190	days	6 years.	
		Averaging Time - Car	25,550	days	70 years, default value for human life span.	USEPA, 2001a.

Notes:
RME = Reasonable Maximum Exposure

Source References:
- BPJ: Best Professional Judgement.
- USEPA, 1997: Exposure Factors Handbook
- USEPA, 2001a: Supplemental Guidance For Developing Soil Screening Levels For Superfund Sites. Peer Review Draft.
- USEPA, 2001b: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim Review Draft - For Public Comment.

TABLE 5
TOXICITY VALUES
RI/FS - SEADs-59 and 71
Seneca Army Depot Activity

Analyte	Oral RfD (mg/kg-day)		Inhalation RfD (mg/kg-day)		Carc. Slope Oral (mg/kg-day)-1		Rank Wt. of Evidence	Carc. Slope Inhalation (mg/kg-day)-1		Dermal RfD (mg/kg-day)		Carc. Slope Dermal (mg/kg-day)-1		Oral Absorption Factor	
Semivolatiles															
2-Fluorobiphenyl	NA		NA		NA		NA	NA		NA	f	NA	g	1	j
2-Methylnaphthalene	4.00E-03	a	NA		NA		NA	NA		0.004	f	NA	g	1	j
2,4,6-tribromophenol	NA		NA		NA		NA	NA		NA	f	NA	g	1	j
Acenaphthylene	NA		NA		NA		D	NA		NA	f	NA	g	1	j
Benzo(a)anthracene	NA		NA		0.73	i	B2	NA		NA	f	0.73	g	1	j
Benzo(a)pyrene	NA		NA		7.3	a	B2	NA		NA	f	7.3	g	1	j
Benzo(b)fluoranthene	NA		NA		0.73	i	B2	NA		NA	f	0.73	g	1	j
Benzo(ghi)perylene	NA		NA		NA		D	NA		NA	f	NA	g	1	j
Benzo(k)fluoranthene	NA		NA		0.073	i	B2	NA		NA	f	0.073	g	1	j
Carbazole	NA		NA		0.02	b	NA	NA		NA	f	0.02	g	1	j
Chrysene	NA		NA		0.0073	i	B2	NA		NA	f	0.0073	g	1	j
Dibenz(a,h)anthracene	NA		NA		7.3	i	B2	NA		NA	f	7.3	g	1	j
Dibenzofuran	2.00E-03	i	NA		NA		D	NA		0.002	f	NA	g	1	j
Fluoranthene	0.04	a	NA		NA		D	NA		0.04	f	NA	g	1	j
Fluorene	0.04	a	NA		NA		D	NA		0.04	f	NA	g	1	j
Indeno(1,2,3-cd)pyrene	NA		NA		0.73	i	B2	NA		NA	f	0.73	g	1	j
Naphthalene	0.02	a	0.0009	a	NA		C	NA		0.02	f	NA	g	1	j
Pentachlorophenol	0.03	a	NA		0.12	a	B2	NA		0.03	f	0.12	g	1	j
Phenanthrene	NA		NA		NA		D	NA		NA	f	NA	g	1	j
Pyrene	0.03	a	NA		NA		D	NA		0.03	f	NA	g	1	j
Pesticides/PCBs															
4,4'-DDD	NA		NA		0.24	a	B2	NA		NA	f	0.24	g	1	j
4,4'-DDE	NA		NA		0.34	a	B2	NA		NA	f	0.34	g	1	j
4,4'-DDT	0.0005	a	NA		0.34	a	B2	0.34	a	0.0005	f	0.34	g	1	j
Aroclor-1260	0.00002	a	NA		2	a	B2	0.4	a	0.00002	f	2	g	1	j
alpha-BHC					6.3	a	B2	6.3	a			6.3	g	1	j
Heptachlor epoxide	1.30E-05	a			9.1	a	B2	9.1	a	0.000013	f	9.1	g	1	j
Metals															
Aluminum	1	c	1E-03	c	NA		NA	NA		1	f	NA	g	1	j
Antimony	0.0004	a	NA		NA		NA	NA		0.00006	f	NA	g	0.15	j
Arsenic	0.0003	a	NA		1.5	a	A	15.1	a	0.0003	f	1.5	g	1	j
Barium	0.07	a	0.00014	a	NA		D	NA		0.0049	f	NA	g	0.07	j
Beryllium	2.00E-03	a	5.7E-06	a	NA		B1	8.4	a	0.000014	f	NA	g	0.007	j
Cadmium	0.0005	a	5.70E-05	i	NA		B1	6.3	a	0.0000125	f	NA	g	0.025	j
Chromium	3.00E-03	a	3E-05	a	NA		A	42	a	0.00009	f	NA	g	0.03	j
Cobalt	0.02	c	5.71E-06	c	NA		NA	9.8	c	0.02	f	NA	g	1	j
Copper	0.04	b	NA		NA		D	NA		0.04	f	NA	g	1	j
Iron	3.00E-01	i	NA		NA		NA	NA		0.3	f	NA	g	1	j
Manganese	0.05	a	1.4E-05	a	NA		D	NA		0.001866667	f	NA	g	0.04	j
Mercury	0.0003	a	8.6E-05	a	NA		C for mercuric chloride	NA		0.000021	f	NA	g	0.07	j
Nickel	0.02	a	NA		NA		NA	NA		0.0008	f	NA	g	0.04	j
Thallium	8.00E-05	b	NA		NA		D	NA		0.00008	f	NA	g	1	j
Vanadium	1.00E-03	c	NA		NA		NA	NA		0.000026	f	NA	g	0.026	j
Zinc	0.3	a	NA		NA		D	NA		0.3	f	NA	g	1	j

a = Values from the Integrated Risk Information System (IRIS) (Online September 2004)
Inhalation RfD and cancer slope factor were calculated from RfC (mg/m^3) and cancer slope factor (per ug/m^3)
based on an assumption of 70 kg body weight and 20 m3/day inhalation rate.
b = Values from HEAST 1997
c = EPA provisional peer-reviewed value, from EPA Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV).
f = Calculated from oral RFD value
g = Calculated from oral slope factor
i = EPA-NCEA provisional value, quoted from EPA Region III RBC Table, 2004
j = Based upon EPA Human Health Evaluation Manual Supplemental Guidance: Dermal Risk Assessment Interim Guidance, 2001
NA = Not Available

TABLE 6A
AMBIENT AIR EXPOSURE POINT CONCENTRATIONS - SEAD-59
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Air EPC from Surface Soil (mg/m^3) CSsurf x PM10 x CF	Equation for Air EPC from Total Soils (mg/m^3) = CStot x PM10 x CF
Variables:	Variables:
CSsurf = Chemical Concentration in Surface Soil, from EPC data (mg/kg)	CStot = Chemical Concentration in Total Soils, from EPC data (mg/kg)
PM10 = Average Measured PM10 Concentration = 17 ug/m^3	PM10 = PM10 Concentration Calculated for Construction Worker= 148 ug/m^3
CF = Conversion Factor = 1E-9 kg/ug	CF = Conversion Factor = 1E-9 kg/ug

Analyte	EPC Data for Surface Soil (mg/kg)	EPC Data for Total Soils (mg/kg)	Calculated Air EPC Surface Soil (mg/m^3)	Calculated Air EPC Total Soils (mg/m^3)
SVOCs				
2-Methylnaphthalene	10	10	1.70E-07	1.48E-06
Acenaphthylene	1.7	1.7	2.89E-08	2.52E-07
Benzo(a)anthracene	16	16	2.72E-07	2.37E-06
Benzo(a)pyrene	14	14	2.38E-07	2.07E-06
Benzo(b)fluoranthene	12	12	2.04E-07	1.78E-06
Benzo(ghi)perylene	9	9	1.53E-07	1.33E-06
Benzo(k)fluoranthene	13	13	2.21E-07	1.92E-06
Chrysene	16	16	2.72E-07	2.37E-06
Dibenz(a,h)anthracene	2.9	2.9	4.93E-08	4.29E-07
Dibenzofuran	2.8	2.8	4.76E-08	4.14E-07
Fluoranthene	44	44	7.48E-07	6.51E-06
Indeno(1,2,3-cd)pyrene	8.7	8.7	1.48E-07	1.29E-06
Phenanthrene	41	41	6.97E-07	6.07E-06
Pyrene	35	35	5.95E-07	5.18E-06
PCB				
Aroclor-1260	0.079	0.079	1.34E-09	1.17E-08
Pesticides				
4,4'-DDD	0.74	0.74	1.26E-08	1.10E-07
4,4'-DDE	2.6	2.6	4.42E-08	3.85E-07
4,4'-DDT	3.7	3.7	6.29E-08	5.48E-07
Metals				
Aluminum	18300	18300	3.11E-04	2.71E-03
Antimony	424	424	7.21E-06	6.28E-05
Arsenic	32.2	32.2	5.47E-07	4.77E-06
Barium	304	304	5.17E-06	4.50E-05
Beryllium	2.6	2.6	4.42E-08	3.85E-07
Cadmium	3.2	3.2	5.44E-08	4.74E-07
Chromium	39.3	39.3	6.68E-07	5.82E-06
Cobalt	47.8	47.8	8.13E-07	7.07E-06
Copper	305	305	5.19E-06	4.51E-05
Iron	64000	64000	1.09E-03	9.47E-03
Manganese	1290	1290	2.19E-05	1.91E-04
Mercury	0.95	0.95	1.62E-08	1.41E-07
Nickel	88.3	88.3	1.50E-06	1.31E-05
Thallium	1.8	1.8	3.06E-08	2.66E-07
Vanadium	28.5	28.5	4.85E-07	4.22E-06
Zinc	341	341	5.80E-06	5.05E-05

TABLE 6B
AMBIENT AIR EXPOSURE POINT CONCENTRATIONS - SEAD-71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Air EPC from Surface Soil (mg/m³) CSsurf x PM10 x CF	Equation for Air EPC from Total Soils (mg/m³) = CStot x PM10 x CF
Variables:	Variables:
CSsurf = Chemical Concentration in Surface Soil, from EPC data (mg/kg)	CStot = Chemical Concentration in Total Soils, from EPC data (mg/kg)
PM10 = Average Measured PM10 Concentration = 17 ug/m³	PM10 = PM10 Concentration Calculated for Construction Worker= 148 ug/m³
CF = Conversion Factor = 1E-9 kg/ug	CF = Conversion Factor = 1E-9 kg/ug

Analyte	EPC Data for Surface Soil (mg/kg)	EPC Data for Total Soils (mg/kg)	Calculated Air EPC Surface Soil (mg/m³)	Calculated Air EPC Total Soils (mg/m³)
SVOCs				
2-Methylnaphthalene	31	31	5.27E-07	4.59E-06
Acenaphthylene	1.8	1.8	3.06E-08	2.66E-07
Benzo(a)anthracene	150	150	2.55E-06	2.22E-05
Benzo(a)pyrene	120	120	2.04E-06	1.78E-05
Benzo(b)fluoranthene	88	88	1.50E-06	1.30E-05
Benzo(ghi)perylene	62	62	1.05E-06	9.18E-06
Benzo(k)fluoranthene	130	130	2.21E-06	1.92E-05
Carbazole	77	77	1.31E-06	1.14E-05
Chrysene	150	150	2.55E-06	2.22E-05
Dibenz(a,h)anthracene	25	25	4.25E-07	3.70E-06
Dibenzofuran	38	38	6.46E-07	5.62E-06
Fluoranthene	440	440	7.48E-06	6.51E-05
Fluorene	62	62	1.05E-06	9.18E-06
Indeno(1,2,3-cd)pyrene	65	65	1.11E-06	9.62E-06
Naphthalene	46	46	7.82E-07	6.81E-06
Phenanthrene	290	290	4.93E-06	4.29E-05
Pyrene	280	280	4.76E-06	4.14E-05
Pesticides/PCBs				
Aroclor-1260	0.2	0.2	3.40E-09	2.96E-08
4,4'-DDE	0.81	0.81	1.38E-08	1.20E-07
4,4'-DDT	1.3	1.3	2.21E-08	1.92E-07
Alpha-BHC	0.018	0.018	3.06E-10	2.66E-09
Heptachlor epoxide	0.18	0.18	3.06E-09	2.66E-08
Metals				
Aluminum	18000	18000	3.06E-04	2.66E-03
Antimony	19.3	19.3	3.28E-07	2.86E-06
Arsenic	14.6	14.6	2.48E-07	2.16E-06
Barium	179	179	3.04E-06	2.65E-05
Cadmium	12.1	12.1	2.06E-07	1.79E-06
Chromium	60.3	60.3	1.03E-06	8.92E-06
Copper	134	134	2.28E-06	1.98E-05
Iron	65100	65100	1.11E-03	9.63E-03
Lead	3470	3470	5.90E-05	5.14E-04
Magnesium	59300	59300	1.01E-03	8.78E-03
Manganese	1330	1330	2.26E-05	1.97E-04
Mercury	2.7	2.7	4.59E-08	4.00E-07
Nickel	110	110	1.87E-06	1.63E-05
Thallium	2.3	2.3	3.91E-08	3.40E-07
Vanadium	29.2	29.2	4.96E-07	4.32E-06
Zinc	3660	3660	6.22E-05	5.42E-04

TABLE 6C
AMBIENT AIR EXPOSURE POINT CONCENTRATIONS - SEAD-59 STOCKPILE
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Air EPC from Surface Soil (mg/m³) CSsurf x PM10 x CF	Equation for Air EPC from Total Soils (mg/m³) = CStot x PM10 x CF
Variables: CSsurf = Chemical Concentration in Surface Soil, from EPC data (mg/kg) PM10 = Average Measured PM10 Concentration = 17 ug/m³ CF = Conversion Factor = 1E-9 kg/ug	Variables: CStot = Chemical Concentration in Total Soils, from EPC data (mg/kg) PM10 = PM10 Concentration Calculated for Construction Worker= 148 ug/m³ CF = Conversion Factor = 1E-9 kg/ug

Analyte	EPC Data for Surface Soil (mg/kg)	EPC Data for Total Soils (mg/kg)	Calculated Air EPC Surface Soil (mg/m³)	Calculated Air EPC Total Soils (mg/m³)
SVOCs				
2,4,6-Tribromophenol	0.099	0.099	1.68E-09	1.47E-08
2-Fluorobiphenyl	0.087	0.087	1.48E-09	1.29E-08
Acenaphthylene	3.5	3.5	5.95E-08	5.18E-07
Benzo(a)anthracene	14	14	2.38E-07	2.07E-06
Benzo(a)pyrene	16	16	2.72E-07	2.37E-06
Benzo(b)fluoranthene	11	11	1.87E-07	1.63E-06
Benzo(ghi)perylene	8	8	1.36E-07	1.18E-06
Benzo(k)fluoranthene	13	13	2.21E-07	1.92E-06
Chrysene	13	13	2.21E-07	1.92E-06
Dibenz(a,h)anthracene	2.9	2.9	4.93E-08	4.29E-07
Indeno(1,2,3-cd)pyrene	8	8	1.36E-07	1.18E-06
Pentachlorophenol	0.66	0.66	1.12E-08	9.77E-08
Phenanthrene	17	17	2.89E-07	2.52E-06
Pesticides				
4,4'-DDD	0.45	0.45	7.65E-09	6.66E-08
4,4'-DDE	0.23	0.23	3.91E-09	3.40E-08
4,4'-DDT	0.52	0.52	8.84E-09	7.70E-08
Metals				
Aluminum	13400	13400	2.28E-04	1.98E-03
Antimony	43.9	43.9	7.46E-07	6.50E-06
Arsenic	7.3	7.3	1.24E-07	1.08E-06
Barium	135	135	2.30E-06	2.00E-05
Cadmium	1.2	1.2	2.04E-08	1.78E-07
Chromium	35	35	5.95E-07	5.18E-06
Copper	51.8	51.8	8.81E-07	7.67E-06
Iron	26500	26500	4.51E-04	3.92E-03
Lead	1440	1440	2.45E-05	2.13E-04
Manganese	1220	1220	2.07E-05	1.81E-04
Mercury	0.52	0.52	8.84E-09	7.70E-08
Nickel	56.6	56.6	9.62E-07	8.38E-06
Silver	4.7	4.7	7.99E-08	6.96E-07
Thallium	0.99	0.99	1.68E-08	1.47E-07
Vanadium	35.4	35.4	6.02E-07	5.24E-06

TABLE 7A
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-59
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CA = Chemical Concentration in Air, Calculated from Air EPC Data	ED = Exposure Duration
IR = Inhalation Rate	BW = Bodyweight
EF = Exposure Frequency	AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD	Carc. Slope Inhalation	Air EPC* from Surface Soil	Air EPC* from Total Soils	Industrial Worker				Construction Worker				Child at On-Site Day Care Center			
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	(mg/m3)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
SVOCs																
2-Methylnaphthalene	NA	NA	1.70E-07	1.48E-06												
Acenaphthylene	NA	NA	2.89E-08	2.52E-07												
Benzo(a)anthracene	NA	NA	2.72E-07	2.37E-06												
Benzo(a)pyrene	NA	NA	2.38E-07	2.07E-06												
Benzo(b)fluoranthene	NA	NA	2.04E-07	1.78E-06												
Benzo(ghi)perylene	NA	NA	1.53E-07	1.33E-06												
Benzo(k)fluoranthene	NA	NA	2.21E-07	1.92E-06												
Chrysene	NA	NA	2.72E-07	2.37E-06												
Dibenz(a,h)anthracene	NA	NA	4.93E-08	4.29E-07												
Dibenzofuran	NA	NA	4.76E-08	4.14E-07												
Fluoranthene	NA	NA	7.48E-07	6.51E-06												
Indeno(1,2,3-cd)pyrene	NA	NA	1.48E-07	1.29E-06												
Phenanthrene	NA	NA	6.97E-07	6.07E-06												
Pyrene	NA	NA	5.95E-07	5.18E-06												
PCB																
Aroclor-1260	NA	4.00E-01	1.34E-09	1.17E-08		9.39E-11		4E-11		3.27E-11		1E-11		4.57E-12		2E-12
Pesticides																
4,4'-DDD	NA	NA	1.26E-08	1.10E-07												
4,4'-DDE	NA	NA	4.42E-08	3.85E-07												
4,4'-DDT	NA	3.40E-01	6.29E-08	5.48E-07		4.40E-09		1E-09		1.53E-09		5E-10		2.14E-10		7E-11
Metals																
Aluminum	1.43E-03	NA	3.11E-04	2.71E-03	6.09E-05		4E-02		5.30E-04		4E-01		1.24E-05		9E-03	
Antimony	NA	NA	7.21E-06	6.28E-05												
Arsenic	NA	1.51E+01	5.47E-07	4.77E-06		3.83E-08		6E-07		1.33E-08		2E-07		1.86E-09		3E-08
Barium	1.43E-04	NA	5.17E-06	4.50E-05	1.01E-06		7E-03		8.80E-06		6E-02		2.05E-07		1E-03	
Beryllium	5.71E-06	8.40E+00	4.42E-08	3.85E-07	8.65E-09	3.09E-09	2E-03	3E-08	7.53E-08	1.08E-09	1E-02	9E-09	1.76E-09	1.51E-10	3E-04	1E-09
Cadmium	5.70E-05	6.30E+00	5.44E-08	4.74E-07	1.06E-08	3.80E-09	2E-04	2E-08	9.27E-08	1.32E-09	2E-03	8E-09	2.16E-09	1.85E-10	4E-05	1E-09
Chromium	2.86E-05	4.20E+01	6.68E-07	5.82E-06	1.31E-07	4.67E-08	5E-03	2E-06	1.14E-06	1.63E-08	4E-02	7E-07	2.65E-08	2.27E-09	9E-04	1E-07
Cobalt	5.71E-06	9.80E+00	8.13E-07	7.07E-06	1.59E-07	5.68E-08	3E-02	6E-07	1.38E-06	1.98E-08	2E-01	2E-07	3.23E-08	2.77E-09	6E-03	3E-08
Copper	NA	NA	5.19E-06	4.51E-05												
Iron	NA	NA	1.09E-03	9.47E-03												
Manganese	1.43E-05	NA	2.19E-05	1.91E-04	4.29E-06		3E-01		3.74E-05		3E+00		8.71E-07		6E-02	
Mercury	8.57E-05	NA	1.62E-08	1.41E-07	3.16E-09		4E-05		2.75E-08		3E-04		6.42E-10		7E-06	
Nickel	NA	NA	1.50E-06	1.31E-05												
Thallium	NA	NA	3.06E-08	2.66E-07												
Vanadium	NA	NA	4.85E-07	4.22E-06												
Zinc	NA	NA	5.80E-06	5.05E-05												
Total Hazard Quotient and Cancer Risk:							**4E-01**	**3E-06**			**3E+00**	**1E-06**			**8E-02**	**2E-07**

Assumptions for Industrial Worker		Assumptions for Construction Worker		Assumptions for Child at On-Site Day Care Center	
CA =	EPC Surface Only	CA =	EPC Surface and Sub-Surface	CA =	EPC Surface Only
BW =	70 kg	BW =	70 kg	BW =	15 kg
IR =	20 m^3/day	IR =	20 m^3/day	IR =	0.87 m^3/day
EF =	250 days/year	EF =	250 days/year	EF =	250 days/year
ED =	25 years	ED =	1 year	ED =	6 years
AT (Nc) =	9,125 days	AT (Nc) =	365 days	AT (Nc) =	2,190 days
AT (Car) =	25,550 days	AT (Car) =	25,550 days	AT (Car) =	25,550 days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.

* See TABLE 6A for calculation of Air EPCs

NA= Information not available.

TABLE 7B
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CA = Chemical Concentration in Air, Calculated from Air EPC Data
IR = Inhalation Rate
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day)-1	Air EPC* from Surface Soil (mg/m3)	Air EPC* from Total Soils (mg/m3)	Industrial Worker Intake (mg/kg-day) (Nc)	Industrial Worker Intake (mg/kg-day) (Car)	Industrial Worker Hazard Quotient	Industrial Worker Cancer Risk	Construction Worker Intake (mg/kg-day) (Nc)	Construction Worker Intake (mg/kg-day) (Car)	Construction Worker Hazard Quotient	Construction Worker Cancer Risk	Child at On-Site Day Care Center Intake (mg/kg-day) (Nc)	Child at On-Site Day Care Center Intake (mg/kg-day) (Car)	Child at On-Site Day Care Center Hazard Quotient	Child at On-Site Day Care Center Cancer Risk
SVOCs																
2-Methylnaphthalene	NA	NA	5.27E-07	4.59E-06												
Acenaphthylene	NA	NA	3.06E-08	2.66E-07												
Benzo(a)anthracene	NA	NA	2.55E-06	2.22E-05												
Benzo(a)pyrene	NA	NA	2.04E-06	1.78E-05												
Benzo(b)fluoranthene	NA	NA	1.50E-06	1.30E-05												
Benzo(ghi)perylene	NA	NA	1.05E-06	9.18E-06												
Benzo(k)fluoranthene	NA	NA	2.21E-06	1.92E-05												
Carbazole	NA	NA	1.31E-06	1.14E-05												
Chrysene	NA	NA	2.55E-06	2.22E-05												
Dibenz(a,h)anthracene	NA	NA	4.25E-07	3.70E-06												
Dibenzofuran	NA	NA	6.46E-07	5.62E-06												
Fluoranthene	NA	NA	7.48E-06	6.51E-05												
Fluorene	NA	NA	1.05E-06	9.18E-06												
Indeno(1,2,3-cd)pyrene	NA	NA	1.11E-06	9.62E-06												
Naphthalene	8.57E-04	NA	7.82E-07	6.81E-06	1.53E-07		2E-04		1.33E-06		2E-03		3.11E-08		4E-05	
Phenanthrene	NA	NA	4.93E-06	4.29E-05												
Pyrene	NA	NA	4.76E-06	4.14E-05												
Pesticides/PCBs																
Aroclor-1260	NA	4.00E-01	3.40E-09	2.96E-08		2.38E-10		1E-10		8.28E-11		3E-11		1.16E-11		5E-12
4,4'-DDE	NA	NA	1.38E-08	1.20E-07												
4,4'-DDT	NA	3.40E-01	2.21E-08	1.92E-07		1.54E-09		5E-10		5.38E-10		2E-10		7.53E-11		3E-11
Alpha-BHC	NA	6.30E+00	3.06E-10	2.66E-09		2.14E-11		1E-10		7.45E-12		5E-11		1.04E-12		7E-12
Heptachlor epoxide	NA	9.10E+00	3.06E-09	2.66E-08		2.14E-10		2E-09		7.45E-11		7E-10		1.04E-11		9E-11
Metals																
Aluminum	1.43E-03	NA	3.06E-04	2.66E-03	5.99E-05		4E-02		5.21E-04		4E-01		1.22E-05		9E-03	
Antimony	NA	NA	3.28E-07	2.86E-06												
Arsenic	NA	1.51E+01	2.48E-07	2.16E-06		1.73E-08		3E-07		6.04E-09		9E-08		8.45E-10		1E-08
Barium	1.43E-04	NA	3.04E-06	2.65E-05	5.95E-07		4E-03		5.18E-06		4E-02		1.21E-07		8E-04	
Cadmium	5.70E-05	6.30E+00	2.06E-07	1.79E-06	4.03E-08	1.44E-08	7E-04	9E-08	3.50E-07	5.01E-09	6E-03	3E-08	8.17E-09	7.00E-10	1E-04	4E-09
Chromium	2.86E-05	4.20E+01	1.03E-06	8.92E-06	2.01E-07	7.16E-08	7E-03	3E-06	1.75E-06	2.49E-08	6E-02	1E-06	4.07E-08	3.49E-09	1E-03	1E-07
Copper	NA	NA	2.28E-06	1.98E-05												
Iron	NA	NA	1.11E-03	9.63E-03												
Lead	NA	NA	5.90E-05	5.14E-04												
Magnesium	NA	NA	1.01E-03	8.78E-03												
Manganese	1.43E-05	NA	2.26E-05	1.97E-04	4.42E-06		3E-01		3.85E-05		3E+00		8.98E-07		6E-02	
Mercury	8.57E-05	NA	4.59E-08	4.00E-07	8.98E-09		1E-04		7.82E-08		9E-04		1.82E-09		2E-05	
Nickel	NA	NA	1.87E-06	1.63E-05												
Thallium	NA	NA	3.91E-08	3.40E-07												
Vanadium	NA	NA	4.96E-07	4.32E-06												
Zinc	NA	NA	6.22E-05	5.42E-04												
Total Hazard Quotient and Cancer Risk:							4E-01	3E-06			3E+00	1E-06			7E-02	2E-07

	Assumptions for Industrial Worker		Assumptions for Construction Worker		Assumptions for Child at On-Site Day Care Center
CA =	EPC Surface Only	CA =	EPC Surface and Sub-Surface	CA =	EPC Surface Only
BW =	70 kg	BW =	70 kg	BW =	15 kg
IR =	20 m^3/day	IR =	20 m^3/day	IR =	0.87 m^3/day
EF =	250 days/year	EF =	250 days/year	EF =	250 days/year
ED =	25 years	ED =	1 year	ED =	6 years
AT (Nc) =	9,125 days	AT (Nc) =	365 days	AT (Nc) =	2,190 days
AT (Car) =	25,550 days	AT (Car) =	25,550 days	AT (Car) =	25,550 days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
* See TABLE 6B for calculation of Air EPCs
NA= Information not available.

TABLE 7C
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-59 STOCKPILE
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CA = Chemical Concentration in Air, Calculated from Air EPC Data
IR = Inhalation Rate
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD	Carc. Slope Inhalation	Air EPC* from Surface Soil	Air EPC* from Total Soils	Industrial Worker Intake (mg/kg-day)		Industrial Worker Hazard Quotient	Industrial Worker Cancer Risk	Construction Worker Intake (mg/kg-day)		Construction Worker Hazard Quotient	Construction Worker Cancer Risk	Child at On-Site Day Care Center Intake (mg/kg-day)		Child at On-Site Day Care Center Hazard Quotient	Child at On-Site Day Care Center Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	(mg/m3)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
SVOCs																
2,4,6-Tribromophenol	NA	NA	1.68E-09	1.47E-08												
2-Fluorobiphenyl	NA	NA	1.48E-09	1.29E-08												
Acenaphthylene	NA	NA	5.95E-08	5.18E-07												
Benzo(a)anthracene	NA	NA	2.38E-07	2.07E-06												
Benzo(a)pyrene	NA	NA	2.72E-07	2.37E-06												
Benzo(b)fluoranthene	NA	NA	1.87E-07	1.63E-06												
Benzo(ghi)perylene	NA	NA	1.36E-07	1.18E-06												
Benzo(k)fluoranthene	NA	NA	2.21E-07	1.92E-06												
Chrysene	NA	NA	2.21E-07	1.92E-06												
Dibenz(a,h)anthracene	NA	NA	4.93E-08	4.29E-07												
Indeno(1,2,3-cd)pyrene	NA	NA	1.36E-07	1.18E-06												
Pentachlorophenol	NA	NA	1.12E-08	9.77E-08												
Phenanthrene	NA	NA	2.89E-07	2.52E-06												
Pesticides																
4,4'-DDD	NA	NA	7.65E-09	6.66E-08												
4,4'-DDE	NA	NA	3.91E-09	3.40E-08												
4,4'-DDT	NA	3.40E-01	8.84E-09	7.70E-08		6.18E-10		2E-10		2.15E-10		7E-11		3.01E-11		1E-11
Metals																
Aluminum	1.43E-03	NA	2.28E-04	1.98E-03	4.46E-05		3E-02		3.88E-04		3E-01		9.05E-06		6E-03	
Antimony	NA	NA	7.46E-07	6.50E-06												
Arsenic	NA	1.51E+01	1.24E-07	1.08E-06		8.67E-09		1E-07		3.02E-09		5E-08		4.23E-10		6E-09
Barium	1.43E-04	NA	2.30E-06	2.00E-05	4.49E-07		3E-03		3.91E-06		3E-02		9.12E-08		6E-04	
Cadmium	5.70E-05	6.30E+00	2.04E-08	1.78E-07	3.99E-09	1.43E-09	7E-05	9E-09	3.48E-08	4.97E-10	6E-04	3E-09	8.10E-10	6.95E-11	1E-05	4E-10
Chromium	2.86E-05	4.20E+01	5.95E-07	5.18E-06	1.16E-07	4.16E-08	4E-03	2E-06	1.01E-06	1.45E-08	4E-02	6E-07	2.36E-08	2.03E-09	8E-04	9E-08
Copper	NA	NA	8.81E-07	7.67E-06												
Iron	NA	NA	4.51E-04	3.92E-03												
Lead	NA	NA	2.45E-05	2.13E-04												
Manganese	1.43E-05	NA	2.07E-05	1.81E-04	4.06E-06		3E-01		3.53E-05		2E+00		8.24E-07		6E-02	
Mercury	8.57E-05	NA	8.84E-09	7.70E-08	1.73E-09		2E-05		1.51E-08		2E-04		3.51E-10		4E-06	
Nickel	NA	NA	9.62E-07	8.38E-06												
Silver	NA	NA	7.99E-08	6.96E-07												
Thallium	NA	NA	1.68E-08	1.47E-07												
Vanadium	NA	NA	6.02E-07	5.24E-06												
Total Hazard Quotient and Cancer Risk:							3E-01	2E-06			3E+00	7E-07			7E-02	9E-08

Assumptions for Industrial Worker		Assumptions for Construction Worker		Assumptions for Child at On-Site Day Care Center	
CA =	EPC Surface Only	CA =	EPC Surface and Sub-Surface	CA =	EPC Surface Only
BW =	70 kg	BW =	70 kg	BW =	15 kg
IR =	20 m^3/day	IR =	20 m^3/day	IR =	0.87 m^3/day
EF =	250 days/year	EF =	250 days/year	EF =	250 days/year
ED =	25 years	ED =	1 year	ED =	6 years
AT (Nc) =	9,125 days	AT (Nc) =	365 days	AT (Nc) =	2,190 days
AT (Car) =	25,550 days	AT (Car) =	25,550 days	AT (Car) =	25,550 days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
* See TABLE 6C for calculation of Air EPCs
NA= Information not available.

TABLE 8A
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-59
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):

- CS = Chemical Concentration in Soil, Calculated from Soil EPC Data
- IR = Ingestion Rate
- CF = Conversion Factor
- FI = Fraction Ingested
- EF = Exposure Frequency
- ED = Exposure Duration
- BW = Bodyweight
- AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Surface Soil	EPC from Total Soils	Industrial Worker				Construction Worker				Child at On-Site Day Care Center			
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
SVOCs																
2-Methylnaphthalene	4.00E-03	NA	1.00E+01	1.00E+01	9.78E-06		2E-03		3.23E-05		8E-03		9.13E-05		2E-02	
Acenaphthylene	NA	NA	1.70E+00	1.70E+00												
Benzo(a)anthracene	NA	7.30E-01	1.60E+01	1.60E+01		5.59E-06		4E-06		7.38E-07		5E-07		1.25E-05		9E-06
Benzo(a)pyrene	NA	7.30E+00	1.40E+01	1.40E+01		4.89E-06		4E-05		6.46E-07		5E-06		1.10E-05		8E-05
Benzo(b)fluoranthene	NA	7.30E-01	1.20E+01	1.20E+01		4.19E-06		3E-06		5.54E-07		4E-07		9.39E-06		7E-06
Benzo(ghi)perylene	NA	NA	9.00E+00	9.00E+00												
Benzo(k)fluoranthene	NA	7.30E-02	1.30E+01	1.30E+01		4.54E-06		3E-07		6.00E-07		4E-08		1.02E-05		7E-07
Chrysene	NA	7.30E-03	1.60E+01	1.60E+01		5.59E-06		4E-08		7.38E-07		5E-09		1.25E-05		9E-08
Dibenz(a,h)anthracene	NA	7.30E+00	2.90E+00	2.90E+00		1.01E-06		7E-06		1.34E-07		1E-06		2.27E-06		2E-05
Dibenzofuran	2.00E-03	NA	2.80E+00	2.80E+00	2.74E-06		1E-03		9.04E-06		5E-03		2.56E-05		1E-02	
Fluoranthene	4.00E-02	NA	4.40E+01	4.40E+01	4.31E-05		1E-03		1.42E-04		4E-03		4.02E-04		1E-02	
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	8.70E+00	8.70E+00		3.04E-06		2E-06		4.01E-07		3E-07		6.81E-06		5E-06
Phenanthrene	NA	NA	4.10E+01	4.10E+01												
Pyrene	3.00E-02	NA	3.50E+01	3.50E+01	3.42E-05		1E-03		1.13E-04		4E-03		3.20E-04		1E-02	
PCB																
Aroclor-1260	2.00E-05	2.00E+00	7.90E-02	7.90E-02	7.73E-08	2.76E-08	4E-03	6E-08	2.55E-07	3.64E-09	1E-02	7E-09	7.21E-07	6.18E-08	4E-02	1E-07
Pesticides																
4,4'-DDD	NA	2.40E-01	7.40E-01	7.40E-01		2.59E-07		6E-08		3.41E-08		8E-09		5.79E-07		1E-07
4,4'-DDE	NA	3.40E-01	2.60E+00	2.60E+00		9.09E-07		3E-07		1.20E-07		4E-08		2.04E-06		7E-07
4,4'-DDT	5.00E-04	3.40E-01	3.70E+00	3.70E+00	3.62E-06	1.29E-06	7E-03	4E-07	1.19E-05	1.71E-07	2E-02	6E-08	3.38E-05	2.90E-06	7E-02	1E-06
Metals																
Aluminum	1.00E+00	NA	1.83E+04	1.83E+04	1.79E-02		2E-02		5.91E-02		6E-02		1.67E-01		2E-01	
Antimony	4.00E-04	NA	4.24E+02	4.24E+02	4.15E-04		1E+00		1.37E-03		3E+00		3.87E-03		1E+01	
Arsenic	3.00E-04	1.50E+00	3.22E+01	3.22E+01	3.15E-05	1.13E-05	1E-01	2E-05	1.04E-04	1.49E-06	3E-01	2E-06	2.94E-04	2.52E-05	1E+00	4E-05
Barium	7.00E-02	NA	3.04E+02	3.04E+02	2.97E-04		4E-03		9.82E-04		1E-02		2.78E-03		4E-02	
Beryllium	2.00E-03	NA	2.60E+00	2.60E+00	2.54E-06		1E-03		8.40E-06		4E-03		2.37E-05		1E-02	
Cadmium	5.00E-04	NA	3.20E+00	3.20E+00	3.13E-06		6E-03		1.03E-05		2E-02		2.92E-05		6E-02	
Chromium	3.00E-03	NA	3.93E+01	3.93E+01	3.85E-05		1E-02		1.27E-04		4E-02		3.59E-04		1E-01	
Cobalt	2.00E-02	NA	4.78E+01	4.78E+01	4.68E-05		2E-03		1.54E-04		8E-03		4.37E-04		2E-02	
Copper	4.00E-02	NA	3.05E+02	3.05E+02	2.98E-04		7E-03		9.85E-04		2E-02		2.79E-03		7E-02	
Iron	3.00E-01	NA	6.40E+04	6.40E+04	6.26E-02		2E-01		2.07E-01		7E-01		5.84E-01		2E+00	
Manganese	4.67E-02	NA	1.29E+03	1.29E+03	1.26E-03		3E-02		4.17E-03		9E-02		1.18E-02		3E-01	
Mercury	3.00E-04	NA	9.50E-01	9.50E-01	9.30E-07		3E-03		3.07E-06		1E-02		8.68E-06		3E-02	
Nickel	2.00E-02	NA	8.83E+01	8.83E+01	8.64E-05		4E-03		2.85E-04		1E-02		8.06E-04		4E-02	
Thallium	8.00E-05	NA	1.80E+00	1.80E+00	1.76E-06		2E-02		5.81E-06		7E-02		1.64E-05		2E-01	
Vanadium	1.00E-03	NA	2.85E+01	2.85E+01	2.79E-05		3E-02		9.20E-05		9E-02		2.60E-04		3E-01	
Zinc	3.00E-01	NA	3.41E+02	3.41E+02	3.34E-04		1E-03		1.10E-03		4E-03		3.11E-03		1E-02	
Total Hazard Quotient and Cancer Risk:							**2E+00**	**7E-05**			**5E+00**	**9E-06**			**1E+01**	**2E-04**

Assumptions for Industrial Worker		Assumptions for Construction Worker		Assumptions for Child at On-Site Day Care Center	
CF =	1E-06 kg/mg	CF =	1E-06 kg/mg	CF =	1E-06 kg/mg
CS =	EPC Surface Only	CS =	EPC Surface and Subsurface	CS =	EPC Surface Only
BW =	70 kg	BW =	70 kg	BW =	15 kg
IR =	100 mg/day	IR =	330 mg soil/day	IR =	200 mg soil/day
FI =	1 unitless	FI =	1 unitless	FI =	1 unitless
EF =	250 days/year	EF =	250 days/year	EF =	250 days/year
ED =	25 years	ED =	1 years	ED =	6 years
AT (Nc) =	9,125 days	AT (Nc) =	365 days	AT (Nc) =	2,190 days
AT (Car) =	25,550 days	AT (Car) =	25,550 days	AT (Car) =	25,550 days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.

NA= Information not available.

TABLE 8B
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = CS x IR x CF x FI x EF x ED / BW x AT

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Soil, Calculated from Soil EPC Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Surface Soil	EPC from Total Soils	Industrial Worker				Construction Worker				Child at On-Site Day Care Center			
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
SVOCs																
2-Methylnaphthalene	4.00E-03	NA	3.10E+01	3.10E+01	3.03E-05		8E-03		1.00E-04		3E-02		2.83E-04		7E-02	
Acenaphthylene	NA	NA	1.80E+00	1.80E+00												
Benzo(a)anthracene	NA	7.30E-01	1.50E+02	1.50E+02		5.24E-05		4E-05		6.92E-06		5E-06		1.17E-04		9E-05
Benzo(a)pyrene	NA	7.30E+00	1.20E+02	1.20E+02		4.19E-05		3E-04		5.54E-06		4E-05		9.39E-05		7E-04
Benzo(b)fluoranthene	NA	7.30E-01	8.80E+01	8.80E+01		3.08E-05		2E-05		4.06E-06		3E-06		6.89E-05		5E-05
Benzo(ghi)perylene	NA	NA	6.20E+01	6.20E+01												
Benzo(k)fluoranthene	NA	7.30E-02	1.30E+02	1.30E+02		4.54E-05		3E-06		6.00E-06		4E-07		1.02E-04		7E-06
Carbazole	NA	2.00E-02	7.70E+01	7.70E+01		2.69E-05		5E-07		3.55E-06		7E-08		6.03E-05		1E-06
Chrysene	NA	7.30E-03	1.50E+02	1.50E+02		5.24E-05		4E-07		6.92E-06		5E-08		1.17E-04		9E-07
Dibenz(a,h)anthracene	NA	7.30E+00	2.50E+01	2.50E+01		8.74E-06		6E-05		1.15E-06		8E-06		1.96E-05		1E-04
Dibenzofuran	2.00E-03	NA	3.80E+01	3.80E+01	3.72E-05		2E-02		1.23E-04		6E-02		3.47E-04		2E-01	
Fluoranthene	4.00E-02	NA	4.40E+02	4.40E+02	4.31E-04		1E-02		1.42E-03		4E-02		4.02E-03		1E-01	
Fluorene	4.00E-02	NA	6.20E+01	6.20E+01	6.07E-05		2E-03		2.00E-04		5E-03		5.66E-04		1E-02	
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	6.50E+01	6.50E+01		2.27E-05		2E-05		3.00E-06		2E-06		5.09E-05		4E-05
Naphthalene	2.00E-02	NA	4.60E+01	4.60E+01	4.50E-05		2E-03		1.49E-04		7E-03		4.20E-04		2E-02	
Phenanthrene	NA	NA	2.90E+02	2.90E+02												
Pyrene	3.00E-02	NA	2.80E+02	2.80E+02	2.74E-04		9E-03		9.04E-04		3E-02		2.56E-03		9E-02	
Pesticides/PCBs																
Aroclor-1260	2.00E-05	2.00E+00	2.00E-01	2.00E-01	1.96E-07	6.99E-08	1E-02	1E-07	6.46E-07	9.23E-09	3E-02	2E-08	1.83E-06	1.57E-07	9E-02	3E-07
4,4'-DDE	NA	3.40E-01	8.10E-01	8.10E-01		2.83E-07		1E-07		3.74E-08		1E-08		6.34E-07		2E-07
4,4'-DDT	5.00E-04	3.40E-01	1.30E+00	1.30E+00	1.27E-06	4.54E-07	3E-03	2E-07	4.20E-06	6.00E-08	8E-03	2E-08	1.19E-05	1.02E-06	2E-02	3E-07
Alpha-BHC	NA	6.30E+00	1.80E-02	1.80E-02		6.29E-09		4E-08		8.30E-10		5E-09		1.41E-08		9E-08
Heptachlor epoxide	1.30E-05	9.10E+00	1.80E-01	1.80E-01	1.76E-07	6.29E-08	1E-02	6E-07	5.81E-07	8.30E-09	4E-02	8E-08	1.64E-06	1.41E-07	1E-01	1E-06
Metals																
Aluminum	1.00E+00	NA	1.80E+04	1.80E+04	1.76E-02		2E-02		5.81E-02		6E-02		1.64E-01		2E-01	
Antimony	4.00E-04	NA	1.93E+01	1.93E+01	1.89E-05		5E-02		6.23E-05		2E-01		1.76E-04		4E-01	
Arsenic	3.00E-04	1.50E+00	1.46E+01	1.46E+01	1.43E-05	5.10E-06	5E-02	8E-06	4.71E-05	6.73E-07	2E-01	1E-06	1.33E-04	1.14E-05	4E-01	2E-05
Barium	7.00E-02	NA	1.79E+02	1.79E+02	1.75E-04		3E-03		5.78E-04		8E-03		1.63E-03		2E-02	
Cadmium	5.00E-04	NA	1.21E+01	1.21E+01	1.18E-05		2E-02		3.91E-05		8E-02		1.11E-04		2E-01	
Chromium	3.00E-03	NA	6.03E+01	6.03E+01	5.90E-05		2E-02		1.95E-04		6E-02		5.51E-04		2E-01	
Copper	4.00E-02	NA	1.34E+02	1.34E+02	1.31E-04		3E-03		4.33E-04		1E-02		1.22E-03		3E-02	
Iron	3.00E-01	NA	6.51E+04	6.51E+04	6.37E-02		2E-01		2.10E-01		7E-01		5.95E-01		2E+00	
Lead	NA	NA	3.47E+03	3.47E+03												
Magnesium	NA	NA	5.93E+04	5.93E+04												
Manganese	4.67E-02	NA	1.33E+03	1.33E+03	1.30E-03		3E-02		4.29E-03		9E-02		1.21E-02		3E-01	
Mercury	3.00E-04	NA	2.70E+00	2.70E+00	2.64E-06		9E-03		8.72E-06		3E-02		2.47E-05		8E-02	
Nickel	2.00E-02	NA	1.10E+02	1.10E+02	1.08E-04		5E-03		3.55E-04		2E-02		1.00E-03		5E-02	
Thallium	8.00E-05	NA	2.30E+00	2.30E+00	2.25E-06		3E-02		7.43E-06		9E-02		2.10E-05		3E-01	
Vanadium	1.00E-03	NA	2.92E+01	2.92E+01	2.86E-05		3E-02		9.43E-05		9E-02		2.67E-04		3E-01	
Zinc	3.00E-01	NA	3.66E+03	3.66E+03	3.58E-03		1E-02		1.18E-02		4E-02		3.34E-02		1E-01	
Total Hazard Quotient and Cancer Risk:							**6E-01**	**5E-04**			**2E+00**	**6E-05**			**5E+00**	**1E-03**

Assumptions for Industrial Worker			Assumptions for Construction Worker			Assumptions for Child at On-Site Day Care Center		
CF =	1E-06	kg/mg	CF =	1E-06	kg/mg	CF =	1E-06	kg/mg
CS =	EPC Surface Only		CS =	EPC Surface and Subsurface		CS =	EPC Surface Only	
BW =	70	kg	BW =	70	kg	BW =	15	kg
IR =	100	mg/day	IR =	330	mg soil/day	IR =	200	mg soil/day
FI =	1	unitless	FI =	1	unitless	FI =	1	unitless
EF =	250	days/year	EF =	250	days/year	EF =	250	days/year
ED =	25	years	ED =	1	years	ED =	6	years
AT (Nc) =	9,125	days	AT (Nc) =	365	days	AT (Nc) =	2,190	days
AT (Car) =	25,550	days	AT (Car) =	25,550	days	AT (Car) =	25,550	days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
NA= Information not available.

TABLE 8C
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-59 STOCKPILE
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Soil, Calculated from Soil EPC Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Surface Soil	EPC from Total Soils	Industrial Worker				Construction Worker				Child at On-Site Day Care Center			
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
SVOCs																
2,4,6-Tribromophenol	NA	NA	9.90E-02	9.90E-02												
2-Fluorobiphenyl	NA	NA	8.70E-02	8.70E-02												
Acenaphthylene	NA	NA	3.50E+00	3.50E+00												
Benzo(a)anthracene	NA	7.30E-01	1.40E+01	1.40E+01		4.89E-06		4E-06		6.46E-07		5E-07		1.10E-05		8E-06
Benzo(a)pyrene	NA	7.30E+00	1.60E+01	1.60E+01		5.59E-06		4E-05		7.38E-07		5E-06		1.25E-05		9E-05
Benzo(b)fluoranthene	NA	7.30E-01	1.10E+01	1.10E+01		3.84E-06								8.61E-06		
Benzo(ghi)perylene	NA	NA	8.00E+00	8.00E+00												
Benzo(k)fluoranthene	NA	7.30E-02	1.30E+01	1.30E+01		4.54E-06		3E-07		6.00E-07		4E-08		1.02E-05		7E-07
Chrysene	NA	7.30E-03	1.30E+01	1.30E+01		4.54E-06		3E-08		6.00E-07		4E-09		1.02E-05		7E-08
Dibenz(a,h)anthracene	NA	7.30E+00	2.90E+00	2.90E+00		1.01E-06		7E-06		1.34E-07		1E-06		2.27E-06		2E-05
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	8.00E+00	8.00E+00		2.80E-06		2E-06		3.69E-07		3E-07		6.26E-06		5E-06
Pentachlorophenol	3.00E-02	1.20E-01	6.60E-01	6.60E-01	6.46E-07	2.31E-07	2E-05	3E-08	2.13E-06	3.04E-08	7E-05	4E-09	6.03E-06	5.17E-07	2E-04	6E-08
Phenanthrene	NA	NA	1.70E+01	1.70E+01												
Pesticides																
4,4'-DDD	NA	2.40E-01	4.50E-01	4.50E-01		1.57E-07		4E-08		2.08E-08		5E-09		3.52E-07		8E-08
4,4'-DDE	NA	3.40E-01	2.30E-01	2.30E-01		8.04E-08		3E-08		1.06E-08		4E-09		1.80E-07		6E-08
4,4'-DDT	5.00E-04	3.40E-01	5.20E-01	5.20E-01	5.09E-07	1.82E-07	1E-03	6E-08	1.68E-06	2.40E-08	3E-03	8E-09	4.75E-06	4.07E-07	9E-03	1E-07
Metals																
Aluminum	1.00E+00	NA	1.34E+04	1.34E+04	1.31E-02		1E-02		4.33E-02		4E-02		1.22E-01		1E-01	
Antimony	4.00E-04	NA	4.39E+01	4.39E+01	4.30E-05		1E-01		1.42E-04		4E-01		4.01E-04		1E+00	
Arsenic	3.00E-04	1.50E+00	7.30E+00	7.30E+00	7.14E-06	2.55E-06	2E-02	4E-06	2.36E-05	3.37E-07	8E-02	5E-07	6.67E-05	5.71E-06	2E-01	9E-06
Barium	7.00E-02	NA	1.35E+02	1.35E+02	1.32E-04		2E-03		4.36E-04		6E-03		1.23E-03		2E-02	
Cadmium	5.00E-04	NA	1.20E+00	1.20E+00	1.17E-06		2E-03		3.87E-06		8E-03		1.10E-05		2E-02	
Chromium	3.00E-03	NA	3.50E+01	3.50E+01	3.42E-05		1E-02		1.13E-04		4E-02		3.20E-04		1E-01	
Copper	4.00E-02	NA	5.18E+01	5.18E+01	5.07E-05		1E-03		1.67E-04		4E-03		4.73E-04		1E-02	
Iron	3.00E-01	NA	2.65E+04	2.65E+04	2.59E-02		9E-02		8.56E-02		3E-01		2.42E-01		8E-01	
Lead	NA	NA	1.44E+03	1.44E+03												
Manganese	4.67E-02	NA	1.22E+03	1.22E+03	1.19E-03		3E-02		3.94E-03		8E-02		1.11E-02		2E-01	
Mercury	3.00E-04	NA	5.20E-01	5.20E-01	5.09E-07		2E-03		1.68E-06		6E-03		4.75E-06		2E-02	
Nickel	2.00E-02	NA	5.66E+01	5.66E+01	5.54E-05		3E-03		1.83E-04		9E-03		5.17E-04		3E-02	
Silver	5.00E-03	NA	4.70E+00	4.70E+00	4.60E-06		9E-04		1.52E-05		3E-03		4.29E-05		9E-03	
Thallium	8.00E-05	NA	9.90E-01	9.90E-01	9.69E-07		1E-02		3.20E-06		4E-02		9.04E-06		1E-01	
Vanadium	1.00E-03	NA	3.54E+01	3.54E+01	3.46E-05		3E-02		1.14E-04		1E-01		3.23E-04		3E-01	
Total Hazard Quotient and Cancer Risk:							**3E-01**	**6E-05**			**1E+00**	**8E-06**			**3E+00**	**1E-04**

Assumptions for Industrial Worker			Assumptions for Construction Worker			Assumptions for Child at On-Site Day Care Center		
CF =	1E-06	kg/mg	CF =	1E-06	kg/mg	CF =	1E-06	kg/mg
CS =	EPC Surface Only		CS =	EPC Surface and Subsurface		CS =	EPC Surface Only	
BW =	70	kg	BW =	70	kg	BW =	15	kg
IR =	100	mg/day	IR =	330	mg soil/day	IR =	200	mg soil/day
FI =	1	unitless	FI =	1	unitless	FI =	1	unitless
EF =	250	days/year	EF =	250	days/year	EF =	250	days/year
ED =	25	years	ED =	1	years	ED =	6	years
AT (Nc) =	9,125	days	AT (Nc) =	365	days	AT (Nc) =	2,190	days
AT (Car) =	25,550	days	AT (Car) =	25,550	days	AT (Car) =	25,550	days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
NA= Information not available.

TABLE 9A
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-59
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CS = Chemical Concentration in Soil, from Soil EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day)-1	Absorption Factor* (unitless)	EPC Surface Soil (mg/kg)	EPC from Total Soils (mg/kg)	Industrial Worker: Absorbed Dose (mg/kg-day) (Nc)	Industrial Worker: Absorbed Dose (mg/kg-day) (Car)	Industrial Worker: Hazard Quotient	Industrial Worker: Cancer Risk	Construction Worker: Absorbed Dose (mg/kg-day) (Nc)	Construction Worker: Absorbed Dose (mg/kg-day) (Car)	Construction Worker: Hazard Quotient	Construction Worker: Cancer Risk	Child at On-Site Day Care Center: Absorbed Dose (mg/kg-day) (Nc)	Child at On-Site Day Care Center: Absorbed Dose (mg/kg-day) (Car)	Child at On-Site Day Care Center: Hazard Quotient	Child at On-Site Day Care Center: Cancer Risk
SVOCs																	
2-Methylnaphthalene	4.00E-03	NA	1.30E-01	1.00E+01	1.00E+01	8.40E-06		2E-03		1.26E-05		3E-03		3.32E-05		8.31E-03	
Acenaphthylene	NA	NA	1.30E-01	1.70E+00	1.70E+00												
Benzo(a)anthracene	NA	7.30E-01	1.30E-01	1.60E+01	1.60E+01		4.80E-06		4E-06		2.88E-07		2E-07		4.56E-06		3.33E-06
Benzo(a)pyrene	NA	7.30E+00	1.30E-01	1.40E+01	1.40E+01		4.20E-06		3E-05		2.52E-07		2E-06		3.99E-06		2.91E-05
Benzo(b)fluoranthene	NA	7.30E-01	1.30E-01	1.20E+01	1.20E+01		3.60E-06		3E-06		2.16E-07		2E-07		3.42E-06		2.50E-06
Benzo(ghi)perylene	NA	NA	1.30E-01	9.00E+00	9.00E+00												
Benzo(k)fluoranthene	NA	7.30E-02	1.30E-01	1.30E+01	1.30E+01		3.90E-06		3E-07		2.34E-07		2E-08		3.70E-06		2.70E-07
Chrysene	NA	7.30E-03	1.30E-01	1.60E+01	1.60E+01		4.80E-06		4E-08		2.88E-07		2E-09		4.56E-06		3.33E-08
Dibenz(a,h)anthracene	NA	7.30E+00	1.30E-01	2.90E+00	2.90E+00		8.70E-07		6E-06		5.22E-08		4E-07		8.26E-07		6.03E-06
Dibenzofuran	2.00E-03	NA	1.00E-01	2.80E+00	2.80E+00	1.81E-06		9E-04		2.71E-06		1E-03		7.16E-06		3.58E-03	
Fluoranthene	4.00E-02	NA	1.30E-01	4.40E+01	4.40E+01	3.69E-05		9E-04		5.54E-05		1E-03		1.46E-04		3.66E-03	
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	1.30E-01	8.70E+00	8.70E+00		2.61E-06		2E-06		1.57E-07		1E-07		2.48E-06		1.81E-06
Phenanthrene	NA	NA	1.30E-01	4.10E+01	4.10E+01												
Pyrene	3.00E-02	NA	1.30E-01	3.50E+01	3.50E+01	2.94E-05		1E-03		4.41E-05		1E-03		1.16E-04		3.88E-03	
PCB																	
Aroclor-1260	2.00E-05	2.00E+00	1.40E-01	7.90E-02	7.90E-02	7.14E-08	2.55E-08	4E-03	5E-08	1.07E-07	1.53E-09	5E-03	3E-09	2.83E-07	2.42E-08	1E-02	5E-08
Pesticides																	
4,4'-DDD	NA	2.40E-01	3.00E-02	7.40E-01	7.40E-01		5.12E-08		1E-08		3.07E-09		7E-10		4.87E-08		1E-08
4,4'-DDE	NA	3.40E-01	3.00E-02	2.60E+00	2.60E+00		1.80E-07		6E-08		1.08E-08		4E-09		1.71E-07		6E-08
4,4'-DDT	5.00E-04	3.40E-01	3.00E-02	3.70E+00	3.70E+00	7.17E-07	2.56E-07	1E-03	9E-08	1.08E-06	1.54E-08	2E-03	5E-09	2.84E-06	2.43E-07	6E-03	8E-08
Metals																	
Aluminum	1.00E+00	NA	NA	1.83E+04	1.83E+04												
Antimony	6.00E-05	NA	NA	4.24E+02	4.24E+02												
Arsenic	3.00E-04	1.50E+00	3.00E-02	3.22E+01	3.22E+01	6.24E-06	2.23E-06	2E-02	3E-06	9.36E-06	1.34E-07	3E-02	2E-07	2.47E-05	2.12E-06	8E-02	3E-06
Barium	4.90E-03	NA	NA	3.04E+02	3.04E+02												
Beryllium	1.40E-05	NA	NA	2.60E+00	2.60E+00												
Cadmium	1.25E-05	NA	1.00E-03	3.20E+00	3.20E+00	2.07E-08		2E-03		3.10E-08		2E-03		8.18E-08		7E-03	
Chromium	9.00E-05	NA	NA	3.93E+01	3.93E+01												
Cobalt	2.00E-02	NA	NA	4.78E+01	4.78E+01												
Copper	4.00E-02	NA	NA	3.05E+02	3.05E+02												
Iron	3.00E-01	NA	NA	6.40E+04	6.40E+04												
Manganese	1.87E-03	NA	NA	1.29E+03	1.29E+03												
Mercury	2.10E-05	NA	NA	9.50E-01	9.50E-01												
Nickel	8.00E-04	NA	NA	8.83E+01	8.83E+01												
Thallium	8.00E-05	NA	NA	1.80E+00	1.80E+00												
Vanadium	2.60E-05	NA	NA	2.85E+01	2.85E+01												
Zinc	3.00E-01	NA	NA	3.41E+02	3.41E+02												
Total Hazard Quotient and Cancer Risk:								3E-02	5E-05			5E-02	3E-06			1E-01	5E-05

	Assumptions for Industrial Worker	Assumptions for Construction Worker	Assumptions for Child at On-Site Day Care Center
CF =	1E-06 kg/mg	1E-06 kg/mg	1E-06 kg/mg
CS =	EPC Surface Only	EPC Surface and Subsurface	EPC Surface Only
BW =	70 kg	70 kg	15 kg
SA =	3,300 cm^2	3,300 cm^2	2,800 cm^2
AF =	0.2 mg/cm^2	0.3 mg/cm^2	0.2 mg/cm^2
EF =	250 days/year	250 days/year	250 days/year
ED =	25 years	1 years	6 years
AT (Nc) =	9,125 days	365 days	2,190 days
AT (Car) =	25,550 days	25,550 days	25,550 days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
NA= Information not available.

TABLE 9B
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Soil, from Soil EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day)-1	Absorption Factor* (unitless)	EPC Surface Soil (mg/kg)	EPC from Total Soils (mg/kg)	Industrial Worker: Absorbed Dose (mg/kg-day) (Nc)	Industrial Worker: Absorbed Dose (mg/kg-day) (Car)	Industrial Worker: Hazard Quotient	Industrial Worker: Cancer Risk	Construction Worker: Absorbed Dose (mg/kg-day) (Nc)	Construction Worker: Absorbed Dose (mg/kg-day) (Car)	Construction Worker: Hazard Quotient	Construction Worker: Cancer Risk	Child at On-Site Day Care Center: Absorbed Dose (mg/kg-day) (Nc)	Child at On-Site Day Care Center: Absorbed Dose (mg/kg-day) (Car)	Child at On-Site Day Care Center: Hazard Quotient	Child at On-Site Day Care Center: Cancer Risk
SVOCs																	
2-Methylnaphthalene	4.00E-03	NA	1.30E-01	3.10E+01	3.10E+01	2.60E-05		7E-03		3.90E-05		1E-02		1.03E-04		2.58E-02	
Acenaphthylene	NA	NA	1.30E-01	1.80E+00	1.80E+00												
Benzo(a)anthracene	NA	7.30E-01	1.30E-01	1.50E+02	1.50E+02		4.50E-05		3E-05		2.70E-06		2E-06		4.27E-05		3.12E-05
Benzo(a)pyrene	NA	7.30E+00	1.30E-01	1.20E+02	1.20E+02		3.60E-05		3E-04		2.16E-06		2E-05		3.42E-05		2.50E-04
Benzo(b)fluoranthene	NA	7.30E-01	1.30E-01	8.80E+01	8.80E+01		2.64E-05		2E-05		1.58E-06		1E-06		2.51E-05		1.83E-05
Benzo(ghi)perylene	NA	NA	1.30E-01	6.20E+01	6.20E+01												
Benzo(k)fluoranthene	NA	7.30E-02	1.30E-01	1.30E+02	1.30E+02		3.90E-05		3E-06		2.34E-06		2E-07		3.70E-05		2.70E-06
Carbazole	NA	2.00E-02	1.30E-01	7.70E+01	7.70E+01		2.31E-05		5E-07		1.39E-06		3E-08		2.19E-05		4.39E-07
Chrysene	NA	7.30E-03	1.30E-01	1.50E+02	1.50E+02		4.50E-05		3E-07		2.70E-06		2E-08		4.27E-05		3.12E-07
Dibenz(a,h)anthracene	NA	7.30E+00	1.30E-01	2.50E+01	2.50E+01		7.50E-06		5E-05		4.50E-07		3E-06		7.12E-06		5.20E-05
Dibenzofuran	2.00E-03	NA	1.00E-01	3.80E+01	3.80E+01	2.45E-05		1E-02		3.68E-05		2E-02		9.72E-05		4.86E-02	
Fluoranthene	4.00E-02	NA	1.30E-01	4.40E+02	4.40E+02	3.69E-04		9E-03		5.54E-04		1E-02		1.46E-03		3.66E-02	
Fluorene	4.00E-02	NA	1.30E-01	6.20E+01	6.20E+01	5.21E-05		1E-03		7.81E-05		2E-03		2.06E-04		5.15E-03	
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	1.30E-01	6.50E+01	6.50E+01		1.95E-05		1E-05		1.17E-06		9E-07		1.85E-05		1.35E-05
Naphthalene	2.00E-02	NA	1.30E-01	4.60E+01	4.60E+01	3.86E-05		2E-03		5.79E-05		3E-03		1.53E-04		7.65E-03	
Phenanthrene	NA	NA	1.30E-01	2.90E+02	2.90E+02												
Pyrene	3.00E-02	NA	1.30E-01	2.80E+02	2.80E+02	2.35E-04		8E-03		3.53E-04		1E-02		9.31E-04		3.10E-02	
Pesticides/PCBs																	
Aroclor-1260	2.00E-05	2.00E+00	1.40E-01	2.00E-01	2.00E-01	1.81E-07	6.46E-08	9E-03	1E-07	2.71E-07	3.87E-09	1E-02	8E-09	7.16E-07	6.14E-08	3.58E-02	1.23E-07
4,4'-DDE	NA	3.40E-01	3.00E-02	8.10E-01	8.10E-01		5.60E-08		2E-08		3.36E-09		1E-09		5.33E-08		1.81E-08
4,4'-DDT	5.00E-04	3.40E-01	3.00E-02	1.30E+00	1.30E+00	2.52E-07	8.99E-08	5E-04	3E-08	3.78E-07	5.40E-09	8E-04	2E-09	9.97E-07	8.55E-08	1.99E-03	2.91E-08
Alpha-BHC	NA	6.30E+00	1.00E-01	1.80E-02	1.80E-02		4.15E-09		3E-08		2.49E-10		2E-09		3.95E-09		2.49E-08
Heptachlor epoxide	1.30E-05	9.10E+00	1.00E-01	1.80E-01	1.80E-01	1.16E-07	4.15E-08	9E-03	4E-07	1.74E-07	2.49E-09	1E-02	2E-08	4.60E-07	3.95E-08	3.54E-02	3.59E-07
Metals																	
Aluminum	1.00E+00	NA	NA	1.80E+04	1.80E+04												
Antimony	6.00E-05	NA	NA	1.93E+01	1.93E+01												
Arsenic	3.00E-04	1.50E+00	3.00E-02	1.46E+01	1.46E+01	2.83E-06	1.01E-06	9E-03	2E-06	4.24E-06	6.06E-08	1E-02	9E-08	1.12E-05	9.60E-07	3.73E-02	1.44E-06
Barium	4.90E-03	NA	NA	1.79E+02	1.79E+02												
Cadmium	1.25E-05	NA	1.00E-03	1.21E+01	1.21E+01	7.81E-08		6E-03		1.17E-07		9E-03		3.09E-07		2.48E-02	
Chromium	9.00E-05	NA	NA	6.03E+01	6.03E+01												
Copper	4.00E-02	NA	NA	1.34E+02	1.34E+02												
Iron	3.00E-01	NA	NA	6.51E+04	6.51E+04												
Lead	NA	NA	NA	3.47E+03	3.47E+03												
Magnesium	NA	NA	NA	5.93E+04	5.93E+04												
Manganese	1.87E-03	NA	NA	1.33E+03	1.33E+03												
Mercury	2.10E-05	NA	NA	2.70E+00	2.70E+00												
Nickel	8.00E-04	NA	NA	1.10E+02	1.10E+02												
Thallium	8.00E-05	NA	NA	2.30E+00	2.30E+00												
Vanadium	2.60E-05	NA	NA	2.92E+01	2.92E+01												
Zinc	3.00E-01	NA	NA	3.66E+03	3.66E+03												
Total Hazard Quotient and Cancer Risk:								**7E-02**	**4E-04**			**1E-01**	**2E-05**			**3E-01**	**4E-04**

Assumptions for Industrial Worker		Assumptions for Construction Worker		Assumptions for Child at On-Site Day Care Center	
CF =	1E-06 kg/mg	CF =	1E-06 kg/mg	CF =	1E-06 kg/mg
CS =	EPC Surface Only	CS =	EPC Surface and Subsurface	CS =	EPC Surface Only
BW =	70 kg	BW =	70 kg	BW =	15 kg
SA =	3,300 cm^2	SA =	3,300 cm^2	SA =	2,800 cm^2
AF =	0.2 mg/cm^2	AF =	0.3 mg/cm^2	AF =	0.2 mg/cm^2
EF =	250 days/year	EF =	250 days/year	EF =	250 days/year
ED =	25 years	ED =	1 years	ED =	6 years
AT (Nc) =	9,125 days	AT (Nc) =	365 days	AT (Nc) =	2,190 days
AT (Car) =	25,550 days	AT (Car) =	25,550 days	AT (Car) =	25,550 days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
NA= Information not available.

TABLE 9C

CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL

REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-59 STOCKPILE

RI/FS - Mini Risk Assessment

Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CS = Chemical Concentration in Soil, from Soil EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Surface Soil	EPC from Total Soils	Industrial Worker				Construction Worker				Child at On-Site Day Care Center			
						Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
SVOC																	
2,4,6-Tribromophenol	NA	NA	1.00E-01	9.90E-02	9.90E-02												
2-Fluorobiphenyl	NA	NA	1.00E-01	8.70E-02	8.70E-02												
Acenaphthylene	NA	NA	1.30E-01	3.50E+00	3.50E+00												
Benzo(a)anthracene	NA	7.30E-01	1.30E-01	1.40E+01	1.40E+01		4.20E-06		3E-06		2.52E-07		2E-07		3.99E-06		2.91E-06
Benzo(a)pyrene	NA	7.30E+00	1.30E-01	1.60E+01	1.60E+01		4.80E-06		4E-05		2.88E-07		2E-06		4.56E-06		3.33E-05
Benzo(b)fluoranthene	NA	7.30E-01	1.30E-01	1.10E+01	1.10E+01		3.30E-06		2E-06		1.98E-07		1E-07		3.13E-06		2.29E-06
Benzo(ghi)perylene	NA	NA	1.30E-01	8.00E+00	8.00E+00												
Benzo(k)fluoranthene	NA	7.30E-02	1.30E-01	1.30E+01	1.30E+01		3.90E-06		3E-07		2.34E-07		2E-08		3.70E-06		2.70E-07
Chrysene	NA	7.30E-03	1.30E-01	1.30E+01	1.30E+01		3.90E-06		3E-08		2.34E-07		2E-09		3.70E-06		2.70E-08
Dibenz(a,h)anthracene	NA	7.30E+00	1.30E-01	2.90E+00	2.90E+00		8.70E-07		6E-06		5.22E-08		4E-07		8.26E-07		6.03E-06
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	1.30E-01	8.00E+00	8.00E+00		2.40E-06		2E-06		1.44E-07		1E-07		2.28E-06		1.66E-06
Pentachlorophenol	3.00E-02	1.20E-01	1.00E-01	6.60E-01	6.60E-01	4.26E-07	1.52E-07	1E-05	2E-08	6.39E-07	9.13E-09	2E-05	1E-09	1.69E-06	1.45E-07	5.63E-05	1.74E-08
Phenanthrene	NA	NA	1.30E-01	1.70E+01	1.70E+01												
Pesticides																	
4,4'-DDD	NA	2.40E-01	3.00E-02	4.50E-01	4.50E-01		3.11E-08		7E-09		1.87E-09		4E-10		2.96E-08		7E-09
4,4'-DDE	NA	3.40E-01	3.00E-02	2.30E-01	2.30E-01		1.59E-08		5E-09		9.55E-10		3E-10		1.51E-08		5E-09
4,4'-DDT	5.00E-04	3.40E-01	3.00E-02	5.20E-01	5.20E-01	1.01E-07	3.60E-08	2E-04	1E-08	1.51E-07	2.16E-09	3E-04	7E-10	3.99E-07	3.42E-08	8E-04	1E-08
Metals																	
Aluminum	1.00E+00	NA	NA	1.34E+04	1.34E+04												
Antimony	6.00E-05	NA	NA	4.39E+01	4.39E+01												
Arsenic	3.00E-04	1.50E+00	3.00E-02	7.30E+00	7.30E+00	1.41E-06	5.05E-07	5E-03	8E-07	2.12E-06	3.03E-08	7E-03	5E-08	5.60E-06	4.80E-07	2E-02	7E-07
Barium	4.90E-03	NA	NA	1.35E+02	1.35E+02												
Cadmium	1.25E-05	NA	1.00E-03	1.20E+00	1.20E+00	7.75E-09		6E-04		1.16E-08		9E-04		3.07E-08		2E-03	
Chromium	9.00E-05	NA	NA	3.50E+01	3.50E+01												
Copper	4.00E-02	NA	NA	5.18E+01	5.18E+01												
Iron	3.00E-01	NA	NA	2.65E+04	2.65E+04												
Lead	NA	NA	NA	1.44E+03	1.44E+03												
Manganese	1.87E-03	NA	NA	1.22E+03	1.22E+03												
Mercury	2.10E-05	NA	NA	5.20E-01	5.20E-01												
Nickel	8.00E-04	NA	NA	5.66E+01	5.66E+01												
Silver	2.00E-04	NA	NA	4.70E+00	4.70E+00												
Thallium	8.00E-05	NA	NA	9.90E-01	9.90E-01												
Vanadium	2.60E-05	NA	NA	3.54E+01	3.54E+01												
Total Hazard Quotient and Cancer Risk:								6E-03	5E-05			8E-03	3E-06			2E-02	5E-05

Assumptions for Industrial Worker		Assumptions for Construction Worker		Assumptions for Child at On-Site Day Care Center	
CF =	1E-06 kg/mg	CF =	1E-06 kg/mg	CF =	1E-06 kg/mg
CS =	EPC Surface Only	CS =	EPC Surface and Subsurface	CS =	EPC Surface Only
BW =	70 kg	BW =	70 kg	BW =	15 kg
SA =	3,300 cm^2	SA =	3,300 cm^2	SA =	2,800 cm^2
AF =	0.2 mg/cm^2	AF =	0.3 mg/cm^2	AF =	0.2 mg/cm^2
EF =	250 days/year	EF =	250 days/year	EF =	250 days/year
ED =	25 years	ED =	1 years	ED =	6 years
AT (Nc) =	9,125 days	AT (Nc) =	365 days	AT (Nc) =	2,190 days
AT (Car) =	25,550 days	AT (Car) =	25,550 days	AT (Car) =	25,550 days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.

NA= Information not available.

TABLE 10A
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS - FUTURE INDUSTRIAL USE SCENARIO
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-59
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	HAZARD INDEX		CANCER RISK	
		Hazard Index	Percent Contribution	Cancer Risk	Percent Contribution
INDUSTRIAL WORKER	Inhalation of Dust in Ambient Air	4E-01	20%	3E-06	3%
	Ingestion of Soil	2E+00	78%	7E-05	58%
	Dermal Contact to Soil	3E-02	2%	5E-05	40%
	Ingestion of Groundwater	NQ		NQ	
	TOTAL RECEPTOR RISK (Nc & Car)	*2E+00*	100%	*1E-04*	100%
CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	3E+00	40%	1E-06	8%
	Ingestion of Soil	5E+00	59%	9E-06	70%
	Dermal Contact to Soil	5E-02	1%	3E-06	22%
	TOTAL RECEPTOR RISK (Nc & Car)	*8E+00*	100%	*1E-05*	100%
CHILD AT ON-SITE DAY CARE CENTER	Inhalation of Dust in Ambient Air	8E-02	0.5%	2E-07	0%
	Ingestion of Soil	1E+01	98.6%	2E-04	77%
	Dermal Contact to Soil	1E-01	0.9%	5E-05	23%
	Ingestion of Groundwater	NQ		NQ	
	TOTAL RECEPTOR RISK (Nc & Car)	*1E+01*	100%	*2E-04*	100%

NQ= Not Quantified due to lack of toxicity data.

TABLE 10B
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS - FUTURE INDUSTRIAL USE SCENARIO
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-71
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	HAZARD INDEX		CANCER RISK	
		Hazard Index	Percent Contribution	Cancer Risk	Percent Contribution
INDUSTRIAL WORKER	Inhalation of Dust in Ambient Air	4E-01	36.5%	3E-06	0%
	Ingestion of Soil	6E-01	56.2%	5E-04	54%
	Dermal Contact to Soil	7E-02	7.3%	4E-04	46%
	Ingestion of Groundwater	NQ		NQ	
	TOTAL RECEPTOR RISK (Nc & Car)	*1E+00*	100%	*9E-04*	100%
CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	3E+00	62%	1E-06	1.4%
	Ingestion of Soil	2E+00	36%	6E-05	71.2%
	Dermal Contact to Soil	1E-01	2%	2E-05	27.4%
	TOTAL RECEPTOR RISK (Nc & Car)	*5E+00*	100%	*9E-05*	100%
CHILD AT ON-SITE DAY CARE CENTER	Inhalation of Dust in Ambient Air	7E-02	1.3%	2E-07	0%
	Ingestion of Soil	5E+00	93.5%	1E-03	74%
	Dermal Contact to Soil	3E-01	5.2%	4E-04	26%
	Ingestion of Groundwater	NQ		NQ	
	TOTAL RECEPTOR RISK (Nc & Car)	*6E+00*	100%	*1E-03*	100%

NQ= Not Quantified

TABLE 10C
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS - FUTURE INDUSTRIAL USE SCENARIO
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-59 STOCKPILE SAMPLES
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	HAZARD INDEX		CANCER RISK	
		Hazard Index	Percent Contribution	Cancer Risk	Percent Contribution
INDUSTRIAL WORKER	Inhalation of Dust in Ambient Air	3E-01	49%	2E-06	2%
	Ingestion of Soil	3E-01	50%	6E-05	53%
	Dermal Contact to Soil	6E-03	1%	5E-05	45%
	Ingestion of Groundwater	NQ		NQ	
	TOTAL RECEPTOR RISK (Nc & Car)	*7E-01*	100%	*1E-04*	100%
CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	3E+00	72%	7E-07	6%
	Ingestion of Soil	1E+00	28%	8E-06	68%
	Dermal Contact to Soil	8E-03	0%	3E-06	26%
	TOTAL RECEPTOR RISK (Nc & Car)	*4E+00*	100%	*1E-05*	100%
CHILD AT ON-SITE DAY CARE CENTER	Inhalation of Dust in Ambient Air	7E-02	2.1%	9E-08	0%
	Ingestion of Soil	3E+00	97.2%	1E-04	73%
	Dermal Contact to Soil	2E-02	0.7%	5E-05	27%
	Ingestion of Groundwater	NQ		NQ	
	TOTAL RECEPTOR RISK (Nc & Car)	*3E+00*	100%	*2E-04*	100%

NQ= Not Quantified

Table 11
Summary of Risk-Driving COPC Concentrations - SEAD-59 Stockpile Samples
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Site		SEAD-59	SEAD-59	SEAD-59	SEAD-59	SEAD-59	SEAD-59	SEAD-59
Sample ID		WS-59-01-006-3	WS-59-01-006-9	WS-59-01-007-14	WS-59-01-007-8	WS-59-01-008-2	WS-59-01-008-3	WS-59-01-011-1
Sample Matrix		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date		5/6/2004	5/6/2004	5/6/2004	5/6/2004	5/6/2004	5/6/2004	5/6/2004
Carcinogenic PAHs								
Benzo(a)anthracene	UG/KG	5300	5600	13000	6900	8400	7800	8200
Benzo(a)pyrene	UG/KG	6900	7400	14000	8200	11000	9400	9500
Benzo(b)fluoranthene	UG/KG	4600	5400	9800	5800	7300	6700	10000
Benzo(k)fluoranthene	UG/KG	4300	5400	11000	6300	7200	6500	4200
Chrysene	UG/KG	5400	5700	13000	7000	8500	7900	8000
Dibenz(a,h)anthracene	UG/KG	1600 J	1500 J	2500 J	1600 J	2200 J	1900 J	1600 J
Indeno(1,2,3-cd)pyrene	UG/KG	4500 J	4700 J	7000 J	4100 J	5900 J	5200 J	5800
Benz(a)pyrene Equivalent Concentration	**MG/KG**	**10.0**	**10.6**	**19.7**	**11.6**	**15.5**	**13.4**	**13.6**
Other COPCs								
Antimony	MG/KG							
Iron	MG/KG					26500		
Lead	MG/KG							
Vanadium	MG/KG							

Notes:

1. Benzo(a)pyrene equivalence results greater than 10 mg/kg are presented.

2. The maximum concentration is presented for selected risk-driving COPCs other than carcinogenic PAHs. In addition, the maximum concentration is presented for lead. For antimony, the top three highest results are presented.

Table 11
Summary of Risk-Driving COPC Concentrations - SEAD-59 Stockpile Samples
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Site		SEAD-59	SEAD-59	SEAD-59	SEAD-59	SEAD-59	SEAD-59	SEAD-59	SEAD-59
Sample ID		WS-59-01-011-2	WS-59-01-011-7	WS-59-01-011-8	WS-59-01-011-9	WS-59-01-012-3	WS-59-01-016-1	WS-59-01-016-14	WS-59-01-016-20
Sample Matrix		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date		5/6/2004	5/6/2004	5/6/2004	5/6/2004	5/6/2004	5/6/2004	5/6/2004	5/6/2004
Carcinogenic PAHs									
Benzo(a)anthracene	UG/KG	6900	14000	12000	7700	10000	8200	8400	6800
Benzo(a)pyrene	UG/KG	7400	16000	15000	9900	16000	7600	7300	8500
Benzo(b)fluoranthene	UG/KG	8100	11000	11000	7700	11000	6400	5300	6400
Benzo(k)fluoranthene	UG/KG	3200	13000	11000	7600	13000	6700	5800	6500
Chrysene	UG/KG	6600	13000	12000	7700	11000	9000	7900	7500
Dibenz(a,h)anthracene	UG/KG	1200 J	2800 J	2600 J	1900 J	2900 J	1200 J	1300 J	1800 J
Indeno(1,2,3-cd)pyrene	UG/KG	4500	8000 J	7000 J	5100 J	7800 J	3400 J	3700 J	5000 J
Benz(a)pyrene Equivalent Concentration	**MG/KG**	**10.6**	**22.4**	**20.8**	**14.0**	**22.0**	**10.8**	**10.5**	**12.3**
Other COPCs									
Antimony	MG/KG								
Iron	MG/KG								
Lead	MG/KG								
Vanadium	MG/KG								

Notes:

1. Benzo(a)pyrene equivalence results greater than 10 mg/kg are presented.

2. The maximum concentration is presented for selected risk-driving COPCs other than carcinogenic PAHs. In addition, the maximum concentration is presented for lead. For antimony, the top three highest results are presented.

Table 11
Summary of Risk-Driving COPC Concentrations - SEAD-59 Stockpile Samples
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Site		SEAD-59	SEAD-59	SEAD-59	SEAD-59	SEAD-59
Sample ID		WS-59-01-015-14	WS-59-01-015-16	WS-59-01-011-5	WS-59-01-007-10	WS-59-01-016-10
Sample Matrix		SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date		5/6/2004	5/6/2004	5/6/2004	5/6/2004	5/6/2004
Carcinogenic PAHs						
Benzo(a)anthracene	UG/KG					
Benzo(a)pyrene	UG/KG					
Benzo(b)fluoranthene	UG/KG					
Benzo(k)fluoranthene	UG/KG					
Chrysene	UG/KG					
Dibenz(a,h)anthracene	UG/KG					
Indeno(1,2,3-cd)pyrene	UG/KG					
Benz(a)pyrene Equivalent Concentration	**MG/KG**					
Other COPCs						
Antimony	MG/KG	43.9 J	12	15.6 J		
Iron	MG/KG					
Lead	MG/KG					1440
Vanadium	MG/KG				35.4	

Notes:

1. Benzo(a)pyrene equivalence results greater than 10 mg/kg are presented.

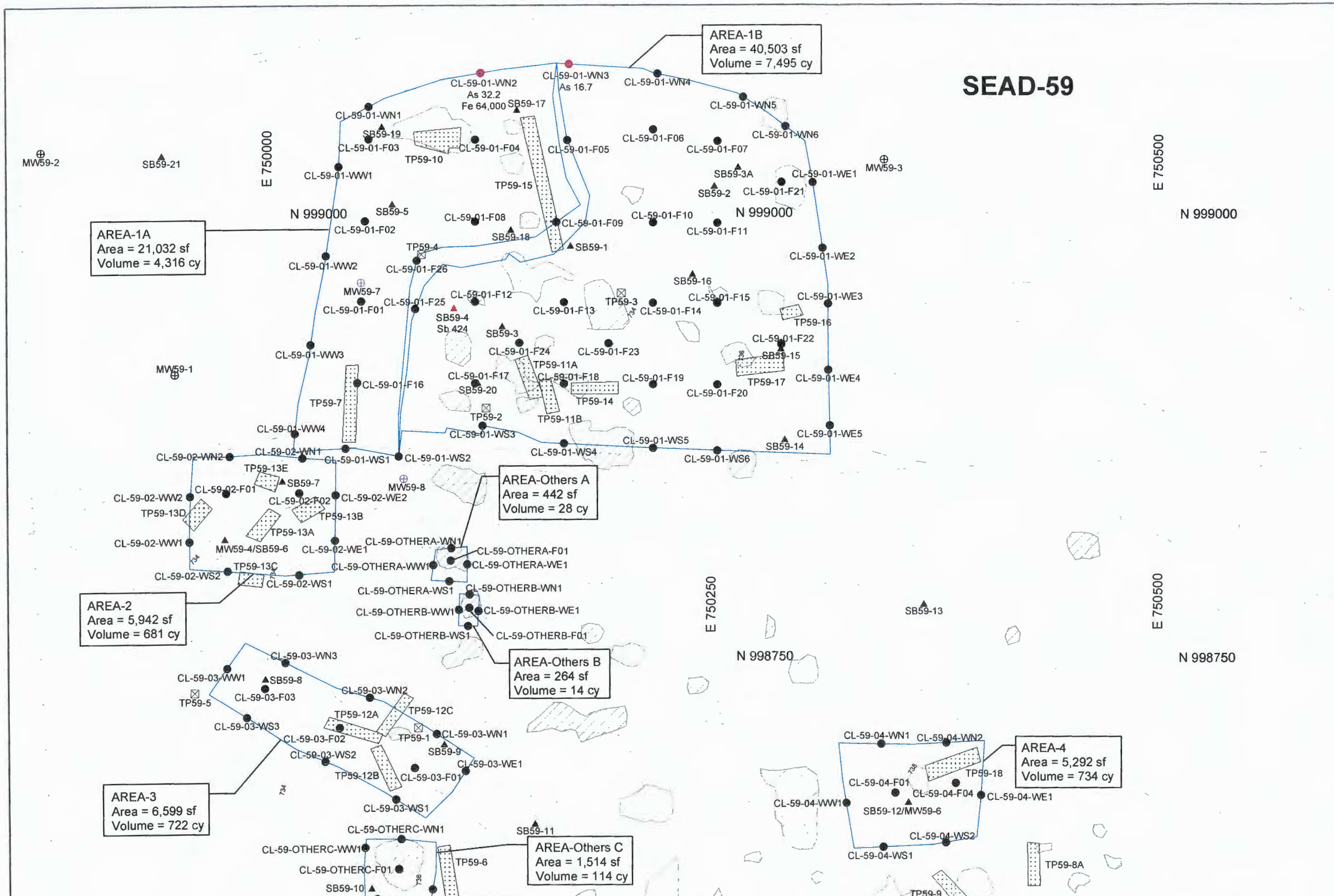
2. The maximum concentration is presented for selected risk-driving COPCs other than carcinogenic PAHs. In addition, the maximum concentration is presented for lead. For antimony, the top three highest results are presented.

Table 12 - Benzo(a)pyrene Toxicity Equivalent Concentrations for SEAD-59/71 and SEAD-59 Stockpile Samples
RI/FS - Mini Risk Assessment
Seneca Army Depot Activity

Site	Total Number of Samples	BTE Maximum (mg/kg)	BTE Average[1] (mg/kg)	Total Number of samples Where BTE > 10 mg/kg		
SEAD-59						
SEAD-59	**215**	**20.9**	**2.2**	**3**		
SEAD-71						
SEAD-71 Outside Fenced Area	62	39.8	2.1	3		
Fenced Area at SEAD-71	15	178.1	47.6	7		
SEAD-71 (Sum)	**77**	**178.1**	**10.9**	**10**		
SEAD-59 Stockpile Samples						
Stockpile Staging Areas	**Total Number of Samples**	**BTE Maximum (mg/kg)**	**BTE Average[1] (mg/kg)**	**Total Number of samples Where BTE > 10 mg/kg**	**Number of Stockpile Lots**	**Estimated Volume [3] (cubic yards)**
Building 128	3	15.5	12.4	2	3	450
North Staging Area	15	19.7	8.4	4	15	2,250
Additional Staging Area	10	22.4	12.4	6	10	1,500
South Staging Area	23	12.3	5.9	3	29	4,350
SEAD-59 Area 4 Staging Area	1	0.3	0.3	0	1	150
Unknown Area[2]	1	7.5	7.5	0	1	150
SEAD-59 Stockpile Samples (Sum)	**53**	**22.4**	**8.0**	**15**	**59**	**8,850**

BTE - Benzo(a)pyrene Toxicity Equivalent Concentration

Notes:
1) Field duplicate pair was considered as one discrete sample and the results were averaged to represent the concentration for the location. Results for fill material were not included in the calculation for SEAD-71.
2) The stockpile staging location for stockpile collected from SEAD-59 Area 1, windrow 013, lot 2 is unknown.
3) A lot is approximately 150 cy according to the ENSR 2002 TCRA Completion Report.



Concentrations for Risk-Driving COPCs in Backfilled Windrow Samples (Exact Location Unknown)

	FD-59-WS-07 (Duplicate of WS-59-01-015-13)	WS-59-01-015-13	FD-59-WS-6 (Duplicate of WS-59-01-012-1)	WS-59-01-013-1
Benzo(a)pyrene (mg/kg)	14	2.1	8.4	7.0
Benzo(a)pyrene Toxicity Equivalent Concentration (mg/kg)	20.9	3.0	11.5	10.2

NOTES: 1. Windrows associated with WS-59-01-012-1 and WS-59-01-013-1 were backfilled to area 1, 3, or 4 according to the ENSR (2002) TCRA Removal Report.
2. No information is available for whereabout of windrow associated with WS-59-01-015-13.

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Legend:

- Base Map Feature
- Test Pit
- Test Pit Location
- Monitoring Well Location (installed during ESI)
- Monitoring Well Location (installed during TCRA)
- Soil Boring/Soil Sample Location
- Time-Critical Removal Action Confirmatory Sample Location
- TCRA Excavation Limit
- Contour
- Surface Debris
- ▲ or ● Sample Location with Risk-Driving COPCs
- CL-59-01-WN3 Sample Location with Risk-Driving COPCs
- As 16.7 Risk-Driving Concentration (mg/kg) for Selected Risk-Driving COPCs

NOTE:
1. Historical investigative sample locations and confirmatory sample locations excavated during the 2002 Time-Critical Removal Action are not shown in the figure.

60 30 0 60 Feet

N

PARSONS

SENECA ARMY DEPOT ACTIVITY
RI/FS Following TCRA at SEAD-59 and SEAD-71

FIGURE 1

**SEAD-59
RISK-DRIVING SAMPLE LOCATIONS**

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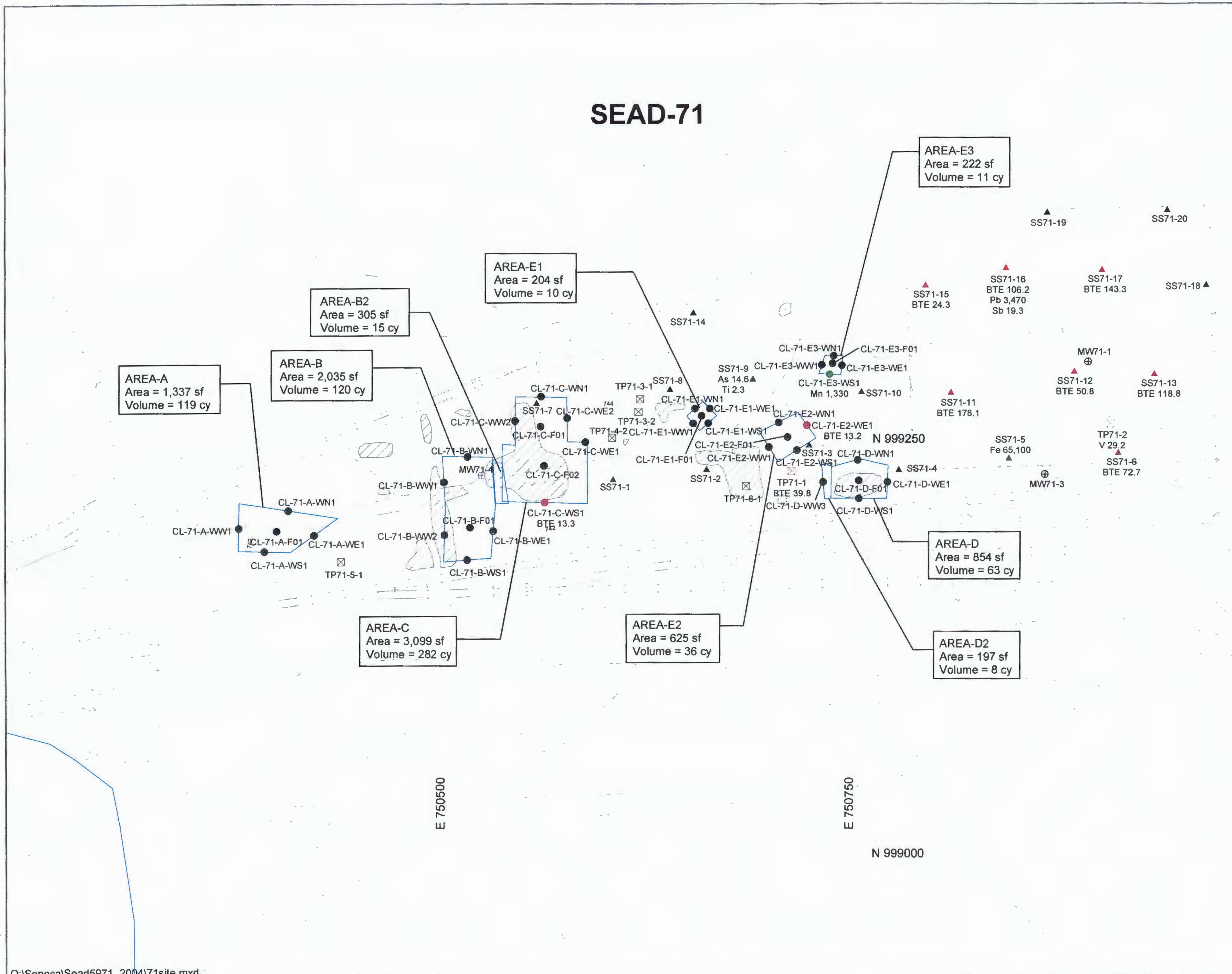

Legend:

N

- Base Map Feature
- Test Pit Location
- Monitoring Well Location (installed during ESI)
- Monitoring Well Location (installed during TCRA)
- Soil Boring/Soil Sample Location
- Time-Critical Removal Action Confirmatory Sample Location
- TCRA Excavation Limit
- Contour
- Suspected Location of GPR Anomaly
- ▲ or or ● SS71-9 As 146 — Sample Location with Maximum Concentration Detected for Selected Risk-Driving COPCs; Maximum Concentration (mg/kg)
- ▲ or ⊠ or ● SS71-11 BTE 178.1 — Sample Location with Benz(a)pyrene Toxicity Equivalent Concentrations Greater Than 10 mg/kg; Benz(a)pyrene Toxicity Equivalent Concentrations (mg/kg)

NOTE:
1. Historical investigative sample locations and confirmatory sample locations excavated during the 2002 Time-Critical Removal Action are not shown in the figure.

60 30 0 60 Feet

PARSONS

SENECA ARMY DEPOT ACTIVITY
RI/FS Following TCRA at
SEAD-59 and SEAD-71

FIGURE 2

SEAD-71
RISK-DRIVING SAMPLE LOCATIONS

September 2004	743519-02300